

July 17, 2013

via electronic transfer

Demaree Collier Remedial Project Manager U.S. EPA SR-6J 77 W Jackson Blvd. Chicago, Illinois 60604-3590



Re:

Certification of Completion of the Remedial Action Report

USEPA Docket No. V-W-02-C-702

Ford Road Landfill Site, Elyria, Lorain County, Ohio

Dear Ms. Collier:

Steerman Environmental Management and Consulting, on behalf of the Ford Road Landfill Settling Parties, is transmitting the attached Certification of Completion of the Remedial Action Report ("COCR"). This plan was prepared by Brown and Caldwell, Inc. and is submitted in accordance with Task 4(C) of the Statement of Work that is attached to the above-referenced Consent Decree. A draft COCR was submitted to U.S. EPA and Ohio EPA on April 30, 2013 and U.S. EPA provided minor editorial comments on July 16, 2013. All comments provided by U.S. EPA were incorporated into the attached report.

If you have any questions, please feel free to the undersigned at (770) 992-2386 or respond by electronic message to psteerman@charter.net.

Sincerely,

Patrick S. Steerman

Ford Road Site Project Coordinator

pss

ec:

Jon Haden, Lathrop & Gage

Rick Isaac, Brown and Caldwell

Robert Thompson, United States Environmental Protection Agency

Vanessa Steigerwald Dick, Ph.D., Ohio Environmental Protection Agency

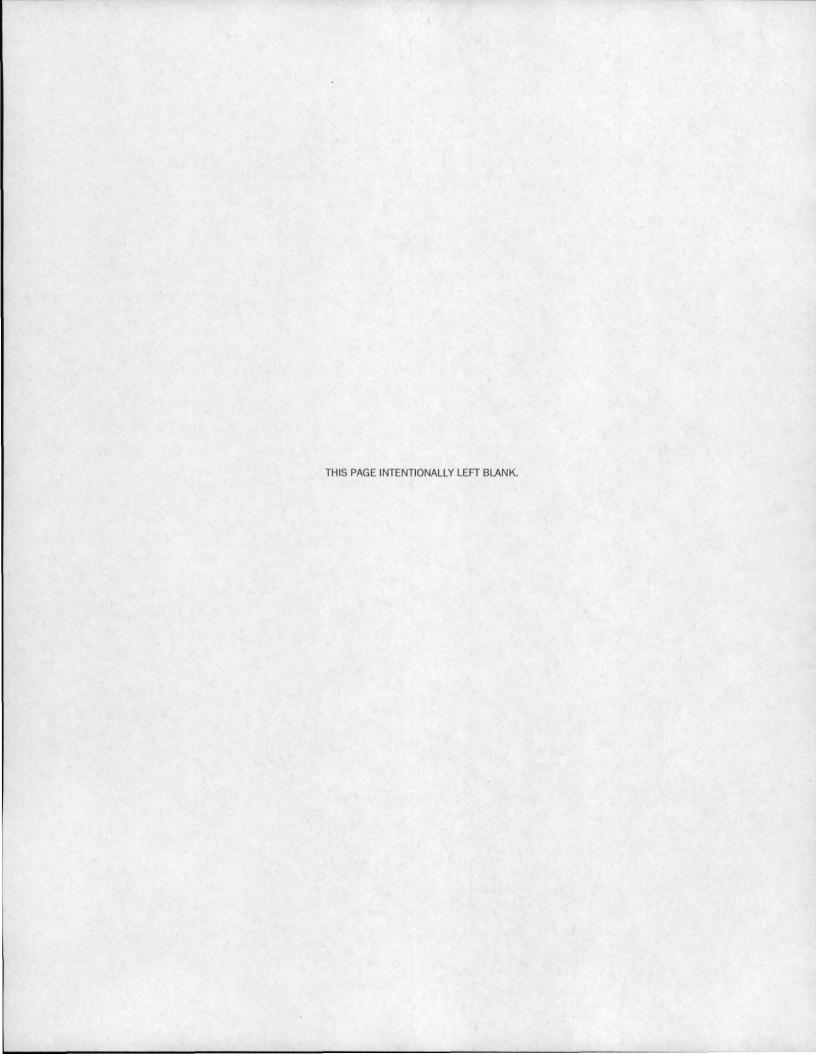
Ford Road Landfill Technical Committee

Steerman Environmental Management & Consulting, LLC 422 Creek View Lane Roswell, Georgia 30075 (404) 421-3275 - Voice psteerman@charter.net

# Ford Road Landfill Certification of Completion of the Remedial Action Report

Prepared for The Ford Road Settling Parties

July 17, 2013



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# **Engineer's Certification**

"I, Richard A. Isaac, being a Registered Professional Engineer in the State of Ohio, PE No. 57074, have personally visited and examined the Ford Road Site throughout the performance of the Phase I and Phase II Remedial Action implementation, I am familiar with the information submitted in this document, and based on my inquiry of the person or persons directly responsible for preparing this Certification of Completion of the Remedial Action Report, I make the following statement:

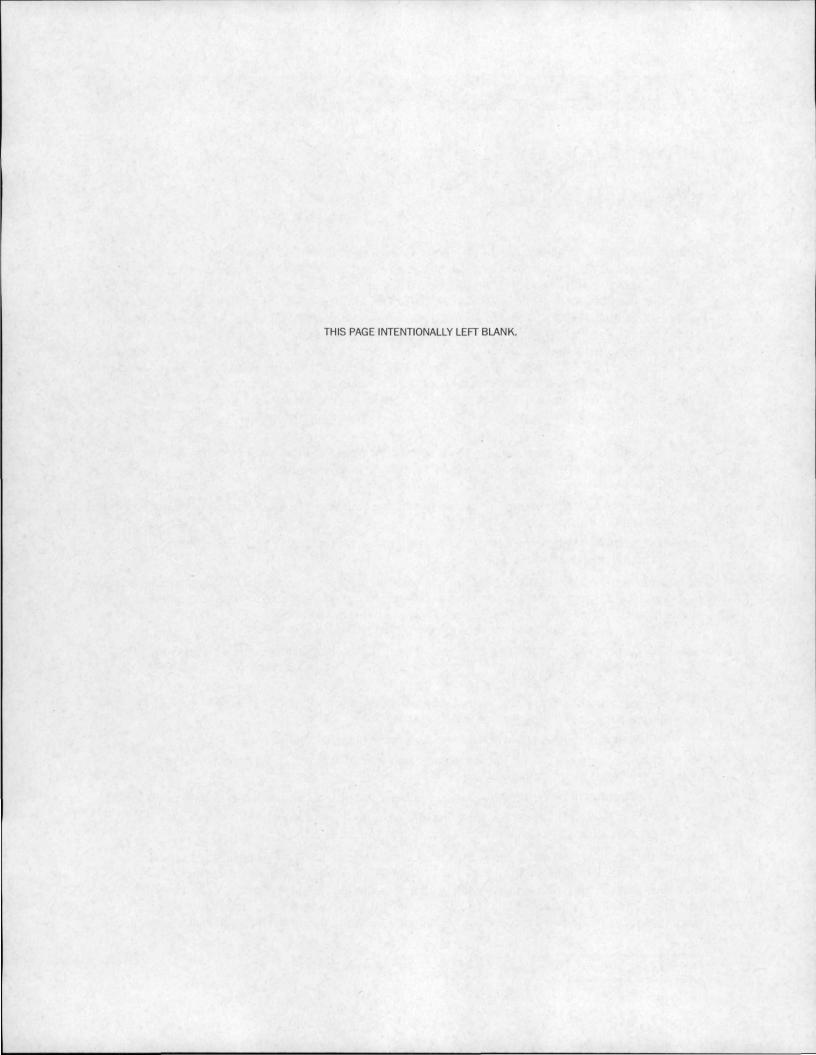
To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

Ruaa	7/12/13		
Signature	Date	ATE OF OHILL	
Richard A. Isaac, P.E.		RICHARD ISAAC	
Name		E-57074	
		SONAL ENGLISH	
On this, the day of	ame is subscribed to the wi		
In witness whereof, I hereunto set my hand and	official seal.		
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**Notary Public** 



KATHLEEN ALLEMAN Notary Public In and for the State of Ohio My Commission Expires August 11, 2014



### Section 1

# Introduction

This Certification of Completion of the Remedial Action Report (Certification Report) for the Ford Road Landfill (the Site) was prepared as required by Section XIV. Certification of Completion, Paragraph 53a of the Ford Road Landfill Remedial Design/Remedial Action (RD/RA) Consent Decree entered on February 18, 2009 (the CD) and in accordance with the Construction Quality Assurance Plan (CQAP) approved as part of the Remedial Action Work Plan (RAWP) approved on August 12, 2011 by the United States Environmental Protection Agency (U.S. EPA), Region 5. A draftCertification Report was submitted to U.S. EPA and Ohio EPA on April 30, 2013. U.S. EPAprovided comments on the draft Certification Report on July 16, 2013 and the following sections incorporate all comments and revisions that were provided by U.S. EPA. The purpose of the Certification Report is to document and verify that construction of the Phase I and Phase II Remedial Actions were performed in accordance with the approved remedial designs, or approved modifications, and with the following provisions of Paragraph 53a of the Consent Decree (CD):

- Synopsis of the work defined in the Statement of Work (SOW) and a demonstration in accordance with the Performance Standards Verification Plan and Performance Standards have been achieved;
- Certification that the Remedial Action has been completed in full satisfaction of the requirements of the CD; and
- A description of how the Setting Parties will implement the U.S. EPA approved Operation and Maintenance Plan.

As outlined in the approved CQAP, the Certification Report provides detailed discussions and information that describes the methodologies used to meet the design objectives and performance standards identified for implementation of the Remedial Action and to assess compliance with the CQAP. The Certification Report includes discussions related to the following items:

- Documentation that the project is consistent with the approved Remedial Design Work Plan (RDWP) and that the Remedial Action implementation was adequately performed in accordance with the approved RAWP;
- Explanation of any alterations/modifications to the approved RDWP and/or RAWP and why these were necessary for the project;
- Summary of the Remedial Action implementation activities;
- Results of monitoring performed to document Remedial Action implementation or design/performance standards; and
- Certification that the Remedial Action has been completed as specified in the SOW and the CD.
- Project Record Drawings documenting the "as-built" Phase I and Phase II Remedial Action implementation.

To address the previously listed items, the Certification Report includes discussions and provides information and data verifying the Phase I and Phase II Remedial Action implementation to be in conformance with the approved design including approved alterations/modifications. Brown and Caldwell performed resident construction quality assurance (CQA) services as a means to verify conformance of the Phase I and Phase II Remedial Action implementation with the approved design including approved

alterations/modifications. The Certification Report format addresses the design conformance verification by providing the following discussion for each component of the Phase I and Phase II Remedial Action implementation:

- The construction/implementation activities performed including methods and procedures and equipment used;
- Material and construction quality assurance/quality control (QA/QC) protocols including both field and laboratory QA/QC testing, as appropriate;
- Field oversight and monitoring activities including documentation of observations and field tests and health and safety protocols; and
- Project Record Drawings prepared from field survey information and data to graphically depict alterations/modifications from the approved design.

QA/QC testing results are discussed in the Certification Report narrative and are summarized in tables included in the appropriate appendices. Alterations/modifications and other changes from the approved RDWP and/or RAWP are noted and discussed in Sections 2.1 for the Phase I Remedial Action implementation and 3.1 for the Phase II Remedial Action implementation of the Certification Report. A certification statement by the certifying Professional Engineer is included as Page viii.

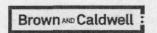
For the purposes of this Certification Report, the term, construction quality assurance (CQA) is used to refer to activities performed by Brown and Caldwell, where quality control (QC) refers to observation and testing activities performed by Op Tech and/or Haynes.

The Phase I fieldwork was performed from August 29, 2011 to May 10, 2012 by Op Tech Environmental Services, Inc. (Op Tech) of East Syracuse, New York under the direction of David Curran (Site Supervisor). The Phase II fieldwork was performed from May 29, 2012 to January 15, 2013 by Mark Haynes Construction, Inc. (Haynes) of Norwalk, Ohio under the direction of Dave Miller (Site Supervisor). Brown and Caldwell performed CQA services with Bill Foster, E.I., S.I., Nate Givens, E.I., Julie McGowan, Amy E. Minner, and Richard A. Isaac, P.E. who provided day-to-day observations and documentation of the Remedial Action implementation. Daily field logs and Weekly Progress Meeting summaries are provided in Appendix A. Construction/ installation photographs are included in Appendix B. Elena R. Goodhall, P.E. of Brown and Caldwell provided project management for the Phase I Remedial Action implementation, Richard A. Isaac, P.E. of Brown and Caldwell served as the project manager for the Phase II Remedial Action implementation and certifying engineer. Qualifications for Mr. Isaac, Ms. Goodhall, Mr. Foster, Mr. Givens, Ms. McGowan and Ms. Minner are included in Appendix C. Project Record Drawings that graphically present the construction/implementation of the Phase I and Phase II Remedial Action implementation are included in Appendix D.

# 1.1 Regulatory Involvement

Throughout the performance of the Remedial Action implementation, representatives of the following regulatory agencies/entities took an active role in attending project meetings, providing oversight where required, and were involved in discussions, reviews, and approvals of field driven alterations/modifications to the approved design:

- U.S. EPA, Region 5:
  - Demaree Collier; Remedial Project Manager
- United States Army Corps of Engineers (ACOE), Buffalo District:
  - William (Bill) T. Frederick, P.G.; U.S. EPA Oversight Contractor
- Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO):
   Vanessa Steigerwald-Dick, Ph.D; Ohio EPA Oversight



Clarrisa Gereby; Ohio EPA Oversight

· Lorain County Parks Department:

Brian Holmes; Park Manager

The agency representatives and the Lorain County Parks Department participated in the Pre-Construction Meetings for both the Phase I and Phase II Remedial Action implementation. Weekly Project Meetings (Meetings) were held at the Site with participation by either attendance at the Site or by conference call-in. The Meetings provided real-time information related to the project status, schedule, and issues that needed to be addressed. Site walkthroughs were conducted following the Meetings that provided a first-hand look at how the Remedial Action implementation was progressing. After each meeting, Brown and Caldwell prepared and distributed a meeting summary which summarized significant discussions, agreements, and future activities.

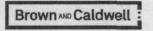
Oversight by the ACOE for specific activities i.e. the North and South Soil Removal Area excavation, material screening, and determination of where the excavated soil was placed; installation of the North and South Seep Drains; etc. was coordinated and scheduled. Site visits by the ACOE and the Ohio EPA were scheduled and observations/oversight was performed.

Several field driven alterations/modifications to the approved design occurred and were addressed during the Remedial Action implementation. The regulatory agencies were actively involved in discussing, evaluating, and providing approval when alterations/modifications arose in the field. The field alterations/modifications are discussed in the appropriate sections of the Certification Report including who was involved in the discussions and approvals.

## 1.2 Organization of the Certification Report

This Certification Report is organized to satisfy the requirements provided in the approved RDWP and RAWP for documentation and verification of the performance of Phase I and Phase II Remedial Action implementation. The following sections and major subsections are provided in the Certification Report:

- Section 1: Introduction provides an overview and the objectives of the Certification Report and includes the following major subsections:
  - 1.1 Regulatory Involvement.
  - 1.2 Organization of the Certification Report.
- Section 2: Phase I Construction provides detailed discussions of how the Phase I Remedial Action was implemented and verified to be in conformance with the approved design including approved alterations/modifications and includes the following major subsections:
  - 2.1 Phase I Alterations/Modifications.
  - 2.2 Quality Control (QC) Information/Testing.
  - 2.3 Contractor Mobilization.
  - 2.4 Site Preparation.
  - 2.5 South Access Road.
  - 2.6 Sedimentation Basin.
  - 2.7 Lower Dewatering Pad.
  - 2.8 North Soil Removal Area.
  - 2.9 South Soil Removal Area.
  - 2.10 Site Restoration and Closure.



- Section 3: Phase II Construction provides detailed discussions of how the Phase II Remedial Action was implemented and verified to be in conformance with the approved design including approved alterations/modifications and includes the following major subsections:
  - 3.1 Phase I Alterations/Modifications.
  - 3.2 Quality Control (QC) Information/Testing.
  - 3.3 Contractor Mobilization.
  - 3.4 Site Preparation.
  - 3.5 South Access Road.
  - 3.6 North Access Road
  - 3.7 Sedimentation Basin.
  - 3.8 Steep Slope Area Soil Buttress.
  - 3.9 Upper Surface Area Final Cover System Cap.
  - 3.10 Ford Road Culvert Outlet Channel.
  - 3.11 Site Restoration and Closure.
- Section 4: Final Site Inspection provides a discussion of the final site inspection performed by the U.S. EPA following completion of Phase II Remedial Action fieldwork on October 26, 2012 and includes the following major subsections:
  - 4.1 Erosion Issues.
  - 4.2 Preliminary Close-Out Report.
- Section 5: Operation and Maintenance Plan Implementation provides a summary of the Operation and Maintenance (O&M) responsibilities following approval of the Certification Report by the U.S. EPA includes the following major subsections:
  - 5.1 Interim Operations and Maintenance Activities.

### Section 2

# **Phase I Construction**

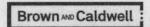
As specified in the approved Remedial Action Work Plan, the Ford Road Remedial Action was scheduled to be conducted in two phases; Phase I scheduled for the 2011 construction season and Phase II scheduled for the 2012 construction season. The Phase I Remedial Action implementation was to include construction of access roads, a sedimentation basin, soil removal activities in the flood plain of the Black River from two areas identified during the site investigation phases of the project, and construction of the base of the buttress system up to the approximate elevation of 612 feet mean sea level (msl). The soil buttress construction was to be completed to an elevation above the 100-year flood plain at the end of Phase I construction which would allow some elements of the Phase II construction to begin relatively early in the spring of 2012.

Due to record rainfall amounts and frequency of storm events that occurred throughout the Phase I Remedial Action implementation, difficulties were encountered in performing the work. The record rainfall and the issues/difficulties the storm events were having on the performance of the Phase I Remedial Action implementation work was discussed with U.S. EPA and the ACOE. Based on these discussions, a decision was made to delay completion of construction of the permanent Sedimentation Basin berm and the Steep Slope Area Soil Buttress (Soil Buttress) from the river plain of the Black River up to elevation 612 feet msl. The construction of the Sedimentation Basin berm and the Soil Buttress were performed as part of the Phase II Remedial Action work discussed as part of the Phase II Construction in Section 3 of the Certification Report.

The Phase I construction was performed, and substantially completed, during the period August 29, 2011 to December 17, 2011. From May 7, 2012 to May 10, 2012, Op-Tech remobilized to the Site to correct the angle of the riprap face along the Black River bank at the former North Soil Removal Area. The Phase I Remedial Action implementation included the performance of the following activities:

- Quality Control (QC) Information/Testing for proposed materials.
- Contractor Mobilization.
- Site Preparation.
- South Access Road.
- Partial Sedimentation Basin Berm Construction.
- · Lower Area Dewatering Pad.
- North Soil Removal Area.
- South Soil Removal Area.
- Site Restoration and Closure.

A discussion of the materials and equipment, construction/installation methods, CQA monitoring, and tests performed for each of the Phase I Remedial Action implementation activities is presented in the following sections of the Certification Report. The narrative includes discussion related to the construction issues/difficulties encountered due to the record rainfall for each of the Phase I construction activities, as appropriate. Alterations/modifications from the approved Phase I construction drawings were implemented in the field and are discussed including agreements and approvals obtained from the U.S. EPA.



## 2.1 Phase I Alterations/Modifications

During the course of the Phase I Remedial Action implementation activities, alterations/modifications from the construction drawings were implemented in the field. The alterations/modifications were discussed with the U.S. EPA to obtain agreement/approval before implementing the alterations/modifications in the field. These alterations/modifications are listed below, and are reflected on the Project Record Drawings included in Appendix D:

- Due to the frequency and intensity of storm events (rainfall) that occurred throughout the performance of the Phase I Remedial Action implementation, the project schedule was extended from the original anticipated construction completion date of October 31, 2011 to December 17, 2011. The frequent rain events caused numerous instances of river flooding that made the Site conditions unworkable and caused construction related issues such as the following:
  - Work shutdowns due to limited or no access to the work area(s).
  - o Difficult and unsafe working conditions i.e. wet soil material caused personnel and equipment to slip/slide.
  - Continuous creation of large ruts in areas being backfilled and soil placement areas causing continual re-working of soil material.
  - The failure to achieve soil compaction requirements due to soil saturation related to the river flooding.

Construction of the sedimentation basin was initiated as part of the Phase I Remedial Action, but difficulties were encountered due to weather (primarily the frequency and amount of rainfall) and the time of year (mid-December 2011). This issue was discussed with U.S. EPA and the ACOE and the decision was made to delay completion of construction of the permanent Sedimentation Basin berm and the Steep Slope Area Soil Buttress (Soil Buttress) from the river plain of the Black River up to elevation 612 feet msl. The construction of the Sedimentation Basin berm and the Soil Buttress were performed as part of the Phase II Remedial Action work.

- Due to the unworkable soil conditions and the inability to obtain the required compaction, a temporary construction road was constructed at the toe of the Steep Slope Area in lieu of the South Access Road across the Sedimentation Basin berm. The temporary construction road, with exception for a portion to the south of the North Soil Removal Area, was located above the river floodplain and not susceptible to the affects of flooding. This road provided better access through the work areas to the North and South Soil Removal Areas.
- As requested by U.S. EPA, the Army Corps of Engineers, and Ohio EPA, the Phase I Remedial Action was modified to include the planting of willow stakes along the top of the riprap wall constructed along the restored riverbank at the former North Soil Removal Area.
- Vegetation of the disturbed areas was performed using a temporary seed mix conducive to the climate conditions (cold temperatures and potential freezing) at the time the work was shutdown for the winter. Use of the temporary seed mix in lieu of the Steep Slope Seed Mix and permanent seeding was discussed between the U.S. EPA, Ohio EPA, the Settling Parties Site Coordinator, and Brown and Caldwell. The decision was made to use the temporary seed mix in an attempt to establish vegetation of the disturbed areas in as fast a manner as possible. The ryegrass and perennial ryegrass are considered quick germinating grasses, which are often used to establish vegetation outside of the optimum seeding periods.
- Based on observations made during visits to the Site through the winter 2011 and early spring 2012, it was determined that the as constructed slope (angle) of the riprap wall constructed along the Black River, as part of the former North Soil Removal Area restoration, did not meet

design specifications. Field surveying confirmed that the constructed slope of the riprap wall was flatter than the required slope. Op-Tech mobilized to the Site in May 2012 and placed additional riprap to correct the outside slope of the riprap wall to the required 2:1 (H:V) slope. Correction of the riprap slope (angle) was necessary to establish the base and slope of the Soil Buttress constructed at the northeast corner of the Site during the Phase II Remedial Action. The placement of additional riprap was observed and documented by Brown and Caldwell.

## 2.2 Quality Control (QC) Information/Testing

Quality Control (QC) information and testing was performed to confirm that the materials proposed for use in the construction/installation are in conformance with the specifications and the CQAP. Op-Tech provided the required QC information and/or laboratory test results for the proposed materials to Brown and Caldwell for review in the form of submittals. Brown and Caldwell reviewed the submittal information to check conformance of the proposed materials with the specifications and the CQAP. The submittals were returned to Op-Tech with one of the following four items indicated:

- · No Exception Taken;
- Make Corrections Noted (Re-submittal Not Required);
- · Revise and Re-Submit (Re-submittal Required); or
- Rejected See Remarks

Once the proposed materials were determined to be in conformance with the specifications and the CQAP, Op-Tech could obtain and have materials delivered to the Site.

The following QC information and testing was performed by Op-Tech for materials used in the Phase I Remedial Action Implementation"

- · Information submittals:
  - o Silt fence:
  - Non-woven geotextile fabric;
  - o 30-mil HDPE geomembrane; and
  - Permanent seed mix.
- Information and laboratory test results submittals:
  - o Slurry wall material (Slurry Wall Work Plan);
  - ODOT 57 Recycled Aggregate;
  - o ODOT 304 Recycled Concrete Aggregate;
  - ODOT 411 Recycled Aggregate;
  - o Steep Slope Area structural fill soil; and
  - o Low permeability soil.

Brown and Caldwell reviewed each of the submittals previously listed and determined the materials to be in conformance with the specifications and the CQAP. The U.S. EPA approved the use of recycled materials. The results of the submittal reviews are provided in Appendix E.

#### 2.3 Contractor Mobilization

Op-Tech mobilized to the Site on August 29, 2011 to start setting up operations to perform the Phase I Remedial Action implementation. Equipment was mobilized and demobilized to and from the Site throughout the performance of the Phase I Remedial Action implementation activities. The following

provides a list of resources and equipment mobilized to the Site to begin the Phase I Remedial Action implementation activities:

- Portable office trailer.
- · Tool trailer with various equipment, hand tools, and supplies.
- Caterpillar XQ20 Rental portable electric power generator.
- 1,000-gallon diesel fuel tank with secondary containment and dispenser.
- Various, 4-wheel drive, crew cab, pickup trucks.
- · Portable sanitary toilet.
- · Hand wash station.
- · Roll-off dumpster.
- Personnel.
  - o Site supervisor.
  - Equipment operators.
  - o Laborers.

The portable sanitary toilet and hand wash station were serviced weekly and the roll-off dumpster was removed and replaced on an as-needed basis. The roll-off dumpster provided by Cooper Disposal, LLC of Avon, Ohio was used only for trash produced by the jobsite personnel. Only non-hazardous solid wastes were placed in the dumpsters. The dumpsters were taken to the Rumpke Transfer Station in Broadview Heights, Ohio with the waste transported to the Noble Road Landfill in Shiloh, Ohio (an Ohio EPA permitted solid waste facility) for off-site disposal.

TTL Associates, Inc. (TTL) of Cleveland, Ohio mobilized to the Site on September 6, 2011 to abandon the seven designated groundwater monitoring wells and demobilized on September 7, 2011. A discussion of the groundwater monitoring well abandonment procedures is provided in Section 2.4.5 of the Certification Report.

# 2.4 Site Preparation

Site preparation activities included the following:

- Erosion and Sediment Control.
- Temporary Construction Entrance.
- · Site Clearing and Grubbing.
- Upper Surface Soil Placement Area.
- · Groundwater Monitoring Well Abandonment.

#### 2.4.1 Erosion and Sediment Control

Erosion and sediment control for the Site included silt fence and straw bales installed at the limits of disturbance and along the Black River floodplain. Op-Tech maintained erosion and sediment controls throughout the Phase I Remedial Action implementation.

Brown and Caldwell prepared a Storm Water Pollution Prevention Plan (SWP3) for the Site under the requirements of Ohio EPA Permit No. OHCOOOOO3 – Authorization for Storm Water Discharges Associated with Construction Activity under the National Pollutant Discharge Elimination System (NPDES) submitted as Appendix D of the RAWP. The erosion and sediment control structures were provided and installed following the provisions of the Ohio Department of Natural Resources (ODNR), Division of Soil and Water Conservation, Rainwater and Land Development – Ohio's Standards for Stormwater Manage-

ment, Land Development, and Urban Stream Protection, Third Edition 2006. An erosion and sediment inspection was performed at least weekly and following storm events.

Brown and Caldwell's CQA monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the erosion and sediment control structures installation. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 2.4.1.1), construction/installation methods (Section 2.4.1.2), and CQA monitoring (Section 2.4.1.3) performed during installation of the erosion and sediment control structures. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC requirements for materials and installation methods is provided in appendices as referenced.

#### 2.4.1.1 Materials and Equipment

The erosion/sediment control materials installed at the Site included the following:

Silt fence - LS 125 Fabric, 36" x 100' rolls; 1-1/2" x 1-1/2" x 48" (nominal) oak stakes on 10' centers.

Product information for the material is provided in Appendix E.

Equipment used for installing the silt fence included the following:

- Caterpillar (Cat) 307B excavator.
- · Cat 228 skid steer loader.
- Various hand tools.

#### 2.4.1.2 Construction/Installation Methods

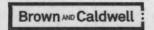
Morton's Landscape Development Company (Morton's), of Columbia Station, Ohio performed installation of the silt fence. The following methods were followed in installing the silt fence:

- Excavated a minimum six-inch deep anchor trench.
- Unrolled silt fence panels and placed the silt fence, with the posts on the downslope side of the fabric, in the trench, leaving at least 16 inches of silt fence material above the original ground surface.
- Pulled the stakes tight and pounded the stakes into the ground at the backside of the trench.
- Seams between silt fence panels were overlapped a minimum of six inches and the end posts of each panel were wrapped together before the stakes were pounded into the ground.
- · Backfilled the trench with the excavated soil.

#### 2.4.1.3 CQA Monitoring

Brown and Caldwell's CQA Monitor visually observed the construction/installation of the erosion and sediment control structures for workmanship and continuity. The construction/installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the erosion and sediment control structures installation are provided in Appendix A with the installation photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during installation of the erosion and sediment control structures:

- Proper location and anchor trench depth.
- Placement of the silt fence in the anchor trench.
- Proper height of silt fence above the original ground surface.
- No sagging of the silt fence fabric between stakes.



- Proper overlap between seams of silt fence panels.
- Proper backfilling of the anchor trench.

The Brown and Caldwell CQA Monitor performed the soil erosion and sedimentation control inspections weekly and within 24 hours of storm events. Copies of the soil erosion and sedimentation control inspection forms are provided in Appendix F.

#### 2.4.2 Temporary Construction Entrance

The temporary construction entrance utilized an existing Site entrance at the south end of the Site, which was at a high point in Ford Road. The temporary construction entrance provided a smooth transition from the Ford Road pavement and aided in reducing the mud tracked off the Site. Op-Tech maintained the temporary construction entrance throughout the Phase I Remedial Action implementation.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the temporary construction entrances. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 2.4.2.1), construction/installation methods (Section 2.4.2.2), and CQA monitoring (Section 2.4.2.3) performed during installation of the temporary construction entrance. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC requirements for materials and installation methods is provided in appendices as noted within each section of the temporary construction entrances discussion.

#### 2.4.2.1 Materials and Equipment

The materials used to construct and maintain the temporary construction entrance included the following:

2-inch to 4-inch recycled brick/aggregate.

The temporary construction entrance was located at a high point in Ford Road; therefore, a culvert was not required.

The temporary construction entrance was constructed using the following equipment:

- Cat D6 dozer.
- Cat 320D excavator.
- Cat 740 articulated end dump.
- · Various hand tools.

#### 2.4.2.2 Construction/Installation Methods

The following activities were performed for the installation/maintenance of the temporary construction entrance:

- The stone was delivered and stockpiled at the Site.
- Op-Tech loaded the stone into the Cat 740 articulated end dump with the Cat 320D excavator.
- The Cat 740 articulated end dump hauled the stone to the temporary construction entrance and dumped the stone.
- The stone was pushed in place and graded using the Cat D6 dozer.

Op-Tech kept a stockpile of the 2-inch to 4-inch stone onsite for use in maintaining the surface of the construction entrance throughout the Phase I Remedial Action implementation.



#### 2.4.2.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the installation of the temporary construction entrance for workmanship and continuity. The installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the installation of the temporary construction entrance is provided in Appendix A with the installation photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during installation of the temporary construction entrance:

- · Proper stone size.
- Proper length, width, and thickness of the construction entrance.
- Proper grading to promote surface water drainage.

The Brown and Caldwell's CQA monitor monitored the condition of the construction entrance and requested Op-Tech to periodically place and grade additional 2-inch to 4-inch stone for maintenance of the temporary construction entrance.

#### 2.4.3 Site Clearing and Grubbing

Following installation of the erosion and sediment controls, Edwards Land Clearing & Tree Service (Edwards), of Amherst, Ohio performed site clearing and grubbing activities. Site clearing and grubbing included the removal of ground cover, brush, trees, the grinding of stumps, and the chipping and off-site disposal of the cleared materials. The materials were separated between Green Circle Growers of Oberlin, Ohio for use as boiler fuel and to Earth & Wood in North Canton, Ohio for recycling into mulch.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the clearing and grubbing activities. The following sections of the Certification Report provide a summary of the written documentation for the equipment (Section 2.4.3.1), construction/installation methods (Section 2.4.3.2), and CQA monitoring (Section 2.4.3.3) performed for the clearing and grubbing activities. Photographic documentation is provided in Appendix B.

#### 2.4.3.1 Equipment

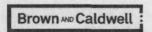
Site clearing and grubbing was performed using the following equipment:

- Komatsu PC 160LC excavator with a grapple hook attachment.
- Husky Brute XL-245 chipper.
- Rayco C100 super crawler with a Fecon mower attachment.
- John Deere 748G skidder.
- Timbco 425EXL with a Quadco saw attachment.
- Komatsu PC 200LC excavator with a Sneller machine stump grinder attachment.
- Various hand tools.

#### 2.4.3.2 Construction/Installation Methods

The following activities were performed for clearing and grubbing:

- Removed designated trees and shrubs and other forms of vegetation.
  - Tree trunks, branches, limbs, and underbrush were transported to and staged in the Upper Surface Area for chipping.
- Surface vegetation, sod, grass, weeds, etc., were not removed.



- Stump grubbing was performed by grinding the stumps to within 2-3 inches of the adjacent ground surface.
- Chipped tree trunks, branches, limbs, and underbrush.
- · Removed chipped material from the Site.

#### 2.4.3.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the site clearing and grubbing activities for work-manship and continuity. The site clearing and grubbing activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the site clearing and grubbing activities are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the site clearing and grubbing activities:

- Removal of trees designated for removal.
- Chipping of tree trunks, branches, limbs, and underbrush and off-site removal of the chipped material.
- Stump grinding to the appropriate height.
- Verified that surface vegetation i.e. sod, grass, weeds, etc., were not removed.

#### 2.4.4 Upper Surface Soil Placement Area

An area located at the high point of the Upper Surface Area was constructed for placement of soil excavated from the North and South Soil Removal Areas. The soil was placed in the Upper Surface Soil Placement Area (Soil Placement Area) and covered with plastic. Samples of the stockpiled soil were collected and analyzed to determine if the soil would need to be removed from the Site and placed in an off-site disposal facility licensed to accept the soil (see Section 2.9 of the Certification Report).

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, CQA monitoring, and testing for the Soil Placement Area construction. The following sections of the Certification Report provide a summary of the written documentation for the equipment (Section 2.4.4.1), construction/installation methods (Section 2.4.4.2), and CQA monitoring performed for the Soil Placement Area construction. Photographic documentation is provided in Appendix B.

#### 2.4.4.1 Materials and Equipment

The materials used to construct and maintain the Soil Placement Area included the following:

• 6-mil Fire Retardant 20x100 Poly Material.

The Soil Placement Area was constructed using the following equipment:

- Cat D6 dozer.
- Various hand tools.

#### 2.4.4.2 Construction/Installation Methods

The following activities were performed for Soil Placement Area construction:

- The Cat D6 dozer pushed the vegetation from an initial 40-foot by 40-foot area.
  - The Soil Placement Area was expanded two additional times (60-feet by 60-feet and 40-feet by 27-feet) to accommodate the volume of soil material requiring placement.
- For each Soil Placement Area, two-foot by two-foot soil berms were constructed around the perimeter.



- o The berms were constructed all three sides for the expanded Soil Placement Areas.
- The plastic was laid on the prepared surface and wrapped over the berms to create a water tight berm.
- The soil was covered with plastic and the plastic was anchored with sand bags on the seams and around the edges.

#### 2.4.4.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the Soil Placement Area construction for workmanship and continuity. Daily Field Logs providing a summary of the Soil Placement Area construction are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the Soil Placement Area construction:

- Removal of vegetation from the Soil Placement Areas.
- Placement and adequate overlap of the plastic panels.
- Placement of the soil on the plastic panels.
- Proper wrapping of the plastic over the berms.
- Covering of the soil and anchoring the plastic.

#### 2.4.5 Groundwater Monitoring Well Abandonment

Seven of the ten groundwater monitoring wells (wells) present at the site were required to be abandoned to provide access for performance of the Phase I Remedial Action implementation activities. The seven wells included the following:

FR-MW-1 FR-MW-4 FR-MW-2 FR-MW-8 FR-MW-3 FR-MW-9 FR-MW-10

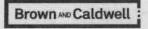
The wells were abandoned following procedures in the approved Field Sampling Plan and generally as outlined in the State of Ohio *Technical Guidance for sealing Unused Wells* by the State Coordinating Committee on Groundwater.

Brown and Caldwell's Geologist performed field oversight to document the materials, equipment, and abandonment procedures for the designated seven wells. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 2.4.5.1), abandonment procedures (Section 2.4.5.2), and field monitoring performed for the well abandonment.

#### 2.4.5.1 Materials and Equipment

The following provides a list of resources and equipment mobilized/demobilized to the Site for performance of the well abandonment activities:

- CME-55 drill rig.
- Support truck.
- · Various hand tools.
- Personnel.
  - o Driller.
  - o Driller helper.



- Granular bentonite.
- Ready-mix concrete.

#### 2.4.5.2 Abandonment Procedures

The following activities were performed by TTL for the well abandonment:

- The protective casings and concrete pads were pulled from the well casings.
- The well casings were pulled to remove as of the well casing as possible.
- The remaining well casing was removed by over-drilling with the CME-55 drill rig equipped with a 4-1/4-inch hollow stem augers.
- The former well hole was tremie grouted to the ground surface with a cement-bentonite grout.
- Soil was placed on top of the grout.
- The protective casings, concrete pads, well casings, and auger cuttings were placed in the Lower Placement Area.
  - These materials were covered with soil material from either the North or South Soil Removal Areas or with Steep Slope Area Soil Buttress soil.
- TTL completed well abandonment forms and submitted the forms to the Ohio Department of Natural Resources (ODNR), which are provided in Appendix K.
- Op-Tech marked the remaining wells, FR-MW-5 and FR-MW-7 with spray paint and survey flagging. No markings were necessary for FR-MW-6 located on the west side of Ford Road and not subjected to the Work.

#### 2.4.5.3 CQA Monitoring

Brown and Caldwell's Geologist visually observed the well abandonment procedures. Daily Field Logs providing a summary of the well abandonments are provided in Appendix A. The following items were observed and documented by the Brown and Caldwell's Geologist for the well abandonments:

- Removal of the protective casings, concrete pads, and well casings including placement of these
  materials in the Lower Placement Area.
- Well augering for complete removal of the well casings including placement of the augered materials in the Lower Placement Area.
- Proper mixing of the cement-bentonite grout.
- Proper tremie grouting of the well holes.
- Placement of soil on top of the grout.

#### 2.5 South Access Road

The South Access Road was constructed from the south side of the temporary construction entrance to the southern end of the Sedimentation Basin. The South Access Road was originally proposed to run along the top of the Sedimentation Basin berm (berm); however, due to weather conditions (rain events) and the associated flooding of the Black River, the location of the northern portion of the South Access Road was modified to run along the existing toe of the Steep Slope Area. This modification provided access for equipment and vehicles past the lower lying berm area to the temporary construction road serving the North and South Soil Removal Areas.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the South Access Road construction. The following sections of the Certification Report provide a summary of the written documentation for the

materials and equipment (Section 2.5.1), construction/installation methods (Section 2.5.2), and CQA monitoring (Section 2.5.3) performed for the South Access Road construction.

#### 2.5.1 Materials and Equipment

The materials used in the construction of the South Access Road included the following:

- 8 oz. non-woven geotextile.
- ODOT 304 aggregate subbase material.
- ODOT 411 stabilized crushed aggregate surface material.

The South Access Road was constructed using the following equipment:

- Cat D6 dozer.
- Cat 320D excavator.
- Cat 740 articulated end dump.
- Cat CS 433E vibratory smooth drum roller
- · Various hand tools.

#### 2.5.2 Construction/Installation Methods

The following activities were performed for the construction of the South Access Road:

- 8 oz. non-woven geotextile, ODOT 304 aggregate, and ODOT 411 aggregate were delivered to the Site.
- Op-Tech placed 8 oz. non-woven geotextile on the south access road. The geotextile was 15 feet
  wide and had seams that were perpendicular to the centerline of the road. The seams were
  overlapped a minimum of six inches and were shingled such that the down gradient seam was
  placed under the up gradient seam.
- Subbase material:
  - Op-Tech loaded ODOT 304 aggregate into the Cat 740 articulated end dump with the Cat 320D excavator.
  - The Cat 740 articulated end dump hauled the aggregate to the South Access Road working area.
  - The Cat D6 dozer pushed the aggregate in place onto the geotextile and graded the aggregate to the required six-inch thickness.
- Surface material:
  - Op-Tech then loaded ODOT 411 aggregate into the Cat 740 articulated end dump with the Cat 320D excavator.
  - The Cat 740 articulated end dump hauled the aggregate to the South Access Road working area.
  - The Cat D6 dozer pushed the aggregate in place onto the ODOT 304 aggregate subbase and graded the aggregate to the required six-inch thickness.
  - The aggregate was rolled with the Cat CS 433E vibratory smooth drum roller making a minimum of four passes.

#### 2.5.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the South Access Road construction for workmanship and continuity. The South Access Road construction was documented in written format using field



books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the South Access Road construction are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the South Access Road construction:

- · Proper placement, alignment, and overlap of the geotextile.
- Observed that equipment did not come in direct contact with the geotextile.
- Monitored the ODOT 304 aggregate placement for movement and/or wrinkles in the underlying geotextile.
- Proper width and thickness of the aggregates.
- Verified that the minimum number of four passes of the Cat CS 433E vibratory smooth drum roller.

#### 2.6 Sedimentation Basin

Due to the number and intensity of rain events throughout the Phase I Remedial Action implementation, the Sedimentation Basin could not be constructed as designed. The frequent rain events caused numerous instances of river flooding that made the Site conditions unworkable and failure of the soil materials to meet compaction requirements. Various materials and construction methods were used in an attempt to construct the berm.

Multiple layers of geotextile fabric and additional Steep Slope structural fill soil material were used with little affect for bridging and/or adding strength to the soft, wet soils present at the proposed berm location. The berm was needed to provide access to the north end of the Site for work at the North and South Soil Removal Areas and construction of the Soil Buttress.

The area along the toe of the Steep Slope Area was higher in elevation and not as susceptible to the affects of the rain events and river flooding. For this reason, a decision was made to construct a temporary construction road along the toe of the Steep Slope Area to provide access to the North and South Soil Removal Areas.

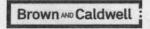
Construction of the berm was limited to blading and grading the soil material present in the floodplain area to shape the berm to provide a temporary area for controlling surface water runoff from the areas disturbed during the Phase I Remedial Action implementation. The Sedimentation Basin construction was completed as part of the Phase II Remedial Action implementation (see Section 3.6 of the Certification Report).

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for construction of the temporary berm. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 2.6.1), construction/installation methods (Section 2.6.2), CQA monitoring (Section 2.6.3), and tests (Section 2.6.4).

#### 2.6.1 Materials and Equipment

The materials used in the construction of the temporary construction road and the temporary berm included the following:

- Temporary Construction Road:
  - o 6-inch to 18-inch rock.
  - o 6 oz. non-woven geotextile.
  - o 4-inch to 8-inch rock.
- Temporary Berm:



- o 8 oz. non-woven geotextile.
- Steep Slope Area structural fill soil furnished by Kurtz.

The temporary construction road and temporary berm were constructed using the following equipment:

- Cat D6 dozer.
- Cat 320D excavator.
- Cat 740 articulated end dump.
- Various hand tools.

#### 2.6.2 Construction/Installation Methods

The following activities were performed for the temporary construction road and construction of the temporary berm:

- Temporary Construction Road:
  - The 4 to 8 inch rock and the 6 to 18 inch rock were delivered to the Site and stockpiled in the Upper Surface Area.
  - Op-Tech removed additional trees along the toe of the Steep Slope Area.
  - Minor grading was performed to slope the road base away from the toe of the Steep Slope Area.
  - Op-Tech excavated wet material from two depressions and placed the material away from the toe of the Steep Slope Area and west of the temporary berm.
  - The 6 to 18 inch rock was placed at the bottom of each excavated depression and up to the elevation of the road base.
  - Placed the 6 oz. geotextile over the entire length of the road from the toe of the South access Road to the southern end of the North Soil Removal Area.
  - Place a 12-inch layer of the 4 to 8 inch rock over the entire length of the road.
  - The aggregate was rolled using the Cat CS 433E vibratory smooth drum roller making a minimum of four passes.
- Berm Construction (southernmost 50 linear feet):
  - Steep Slope Area structural fill soil was delivered and stockpiled in the Upper Surface Area.
  - o The trucks hauled the soil from the borrow areas to the Site.
  - Op-Tech loaded the soil into the Cat 740 articulated end dump with a Cat 320D excavator
  - The Cat 740 articulated end dump hauled the soil to the working area of the temporary berm.
  - The soil was graded to a maximum 12-inch thick loose lifts with the Cat D6 dozer.
  - The thickness of each lift was controlled by visual observation.
  - The Brown and Caldwell CQA monitor(s) visually observed the graded soil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the soil.
  - After each lift was graded, the lift was compacted using the Cat CS 433E vibratory smooth drum roller making a minimum of five passes over the lift.

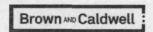


- Prior to placing the next lift, Op-Tech scarified the top of the current lift and at the beginning of each workday.
- At the end of each workday, Op-Tech sealed the top of the current lift with the Cat CS
   433E vibratory smooth drum roller.
- Temporary Berm Construction:
  - Blade and grade the floodplain soil material along the proposed berm centerline with the Cat D6 dozer.

#### 2.6.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the temporary construction road and the temporary berm construction for workmanship and continuity. The temporary construction road and the temporary berm construction were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the temporary construction road and temporary berm construction are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the temporary construction road and the temporary berm construction:

- · Temporary Construction Road:
  - Verified removal of additional trees and placement of the removed trees in the Upper Surface Area.
  - Observed the minor grading to set the slope of the road base for the presence of waste materials; no waste material was encountered.
  - Observed the depression areas excavation and proper placement of the excavated materials.
  - Verified the placement of the 6 to 18 inch rock from the bottom of the excavation up to the road base elevation.
  - Proper placement, alignment, and overlap of the geotextile.
  - Observed that equipment did not come in direct contact with the geotextile.
  - Monitored the 4 to 8 inch rock placement for movement and/or wrinkles in the underlying geotextile.
  - Verified the width and thickness of the placed 4 to 8 inch rock.
  - Verified the aggregate was rolled using the Cat CS 433E vibratory smooth drum roller making a minimum of four passes.
- Berm Construction (southernmost 50 linear feet):
  - o The subbase of the berm was properly scarified for placement of the first soil lift.
  - The presence of large rocks, roots, debris, foreign materials, etc. in the soil material.
     These types of items, when observed, were removed from the soil material.
  - Visually observed the placement and uniformity of the lifts to a maximum uncompacted thickness of 12 inches.
  - Verified the performance of adequate number of passes (minimum of five passes) with the Cat CS 433E vibratory smooth drum roller.
  - Verified that the last lift placed each day was sealed at the end of each workday to preserve the integrity of that lift and promote surface water runoff in the event of a storm.



- Verified that the surface of the each lift was scarified prior to placement of the next lift.
- Temporary Berm Construction:
  - Visually observed the placement and grading of the floodplain soil material along the proposed berm centerline.
  - Verified the width and lines of sideslopes of the temporary berm.

## 2.7 Lower Area Dewatering Pad

The Lower Area Dewatering Pad (Dewatering Pad) provided an area to place wet soil excavated from the North and South Soil Removal Areas. This allowed the wet soils to be dewatered before being hauled and placed in either the Lower Placement Area or the Upper Surface Soil Placement Area (Soil Placement Area). The Dewatering Pad was covered with a 30-mil textured high density polyethylene (HDPE) geo-membrane and equipped with a sump constructed of a 36-inch diameter corrugated plastic pipe (CPP).

The water in the sump was pumped to a 550-gallon poly tank located in the vicinity of the North Soil Removal Area. This water along with water from the North and South Soil Removal Areas was pumped to one of two Baker tanks located in the Upper Surface Area. The Baker tanks and granular activated carbon (GAC) unit were used to store and treat the water prior to discharge to the City of Elyria wastewater treatment plant (WWTP).

#### 2.7.1 Materials and Equipment

The materials used in the construction of the Dewatering Pad included the following:

- Steep Slope Area structural fill soil.
- · 30-mil textured HDPE geomembrane.
- 6-mil Fire Retardant 20x100 Poly Material.
- · 36-inch diameter CPP sump.

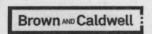
The Dewatering Pad was constructed using the following equipment:

- Cat D6 dozer.
- · Cat 320D excavator.
- Cat 725 articulated end dump.
- 500-gallon poly tank and associated pumps and piping.
- Two, 20,000-gallon Baker tanks, granular activated carbon (GAC) unit, and associated pumps and piping.
- Various hand tools.

#### 2.7.2 Construction/Installation Methods

The following activities were performed for the construction of the Dewatering Pad:

- Steep Slope Area structural fill was delivered to the Site.
- Op-Tech loaded the soil into a Cat 725 articulated end dump with a Cat 320D excavator.
- The Cat 725 articulated end dump hauled the soil to the Dewatering Pad area.
- The Cat D6 dozer pushed the soil into place creating a two-foot wide by two-foot tall containment berm on three sides of the Dewatering Pad. One side of the Dewatering Pad was left open to allow trucks to back up and dump the excavated wet soil material into the Dewatering Pad.



- The bottom of the Dewatering Pad was graded to slope to the middle and then to the eastern end for the water to flow into the sump.
- Op-Tech manually installed the HDPE geomembrane in the Dewatering Pad with the edges of the geomembrane extending across and to the outside edge of the berm.
- A 36-inch diameter CPP sump was installed to collect the water from the dewatering process.
- Op-Tech installed 6-mil poly tarp over the geomembrane in order to keep the geomembrane from becoming cross-contaminated allowing the Dewatering Pad to be used for both the North and South Soil Removal Areas.
  - o Following removal of the soil from the North Soil Removal Area, the 6-mil poly tarp was removed and a new 6-mil poly tarp was installed.

The following activities were performed for the water collected at the Dewatering Pad and water pumped from the North and South Soil Removal Areas:

- The Baker tanks supplied by E-Tanks of Massillon, Ohio and GAC unit supplied by Schrader Environmental Systems, Inc. (Schrader) of Ithaca, Michigan were delivered to the Site.
- The Baker tanks were set up for one tank to receive the water from the poly tank used to store water from the Dewatering Pad and the North and South Soil Removal Areas.
- Water from the first Baker tank was pumped through the GAC unit and into the second Baker tank.
- A representative from the WWTP visited the Site to perform an inspection of the onsite water treatment system. The onsite water treatment system was approved following the inspection.
- Op-Tech collected a sample of the water from the second Baker tank for submittal to Pace Analytical in Columbus, Ohio for analysis of the following parameters provided by the WWTP:
  - o Organochloride Pesticides/PCB.
  - o Mercury.
  - o ICP Metals, Total.
  - o ICP Mineral.
  - o Base/Neutrals/Acids.
  - o Purgeables.
  - o Total Cyanide.
  - o pH.
- Following receipt of the analytical results and review and acceptance by the WWTP, the water
  was pumped to the WWTP. Approximately 20,000 gallons of water was pumped. The analytical
  results are provided in Appendix H.
- The Baker tanks were removed from the Site by E-Tanks.
- The GAC unit was removed from the Site by Schrader with the spent carbon either recycled or disposed in a facility licensed to accept the spent carbon.

#### 2.7.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the Dewatering Pad construction for workmanship and continuity. The Dewatering Pad construction was documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the Dewatering Pad construction are provided in Appendix A with the photographs and descrip-

tive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the Dewatering Pad construction:

- The geomembrane, sump, and poly tarp were visually observed for conformance with the specifications, as well as to verify there were no signs of damage. The geomembrane, sump, and poly tarp were determined to be in conformance with the specifications and no visual damage to the geomembrane, sump, and poly tarp was observed.
- · Proper horizontal and vertical location.
- Proper size of dewatering pad and height of berm.
- Proper grade toward the sump.
- · Proper installation of the geomembrane, sump, and poly tarp.
- Verified that the geomembrane, sump, and poly tarp were not damaged during installation and use.

#### 2.8 North Soil Removal Area

The North Soil Removal Area is defined as the area from the installed slurry wall to the bank/edge of the Black River (see Project Record Drawing RD-13 for the location). Based on the results of the Remedial Investigation, the soils at this location were impacted with light non-aqueous phase liquid (LNAPL) and polychlorinated biphenyls (PCBs) and were excavated as part of the Phase I remediation. The slurry wall was installed to minimize the flow of groundwater into the excavation during the soil removal activity. The slurry wall was constructed with a slurry mix permeability of less than or equal to 1 x 10-6 centimeters per second (cm/sec).

Screening criteria for segregating the excavated soils was developed based on discussions with William T. Frederick of the ACOE and Demaree Collier of the U.S. EPA. A flow chart for the North Soil Removal Area excavated soil was developed to specify the agreed upon procedures for field screening of the soil with PCB test kits and a photoionization detector (PID). The flow chart established criteria for determining where the excavated soil would be staged at the Site.

Initial field screening was performed, as the soil was excavated, for gross contamination related to visible free product, presence of staining, strong hydrocarbon odors, and PCB test kit and PID readings above 50 parts per million (ppm). Soil with initial field screening results that were less than 50 ppm for volatile organic compounds (VOCs) as measured with the PID and PCB test kits for PCBs with no visible/drainable free product was hauled and placed in the Lower Soil Placement Area. Soil with initial screening results less than 50 ppm for VOCs and/or PCBs with free product was staged on the Dewatering Pad. Soil with field screening results greater than or equal to 50 ppm VOCs and/or PCBs was hauled and placed on the Dewatering Pad. Soil accumulated on the Dewatering Pad was screened a second time using the PCB test kits. Re-screened soil with results less than 50 ppm was hauled and placed in the Lower Soil Placement Area. Re-screened soil with results greater than or equal to 50 ppm and no visible/drainable free product was hauled and placed in the Upper Surface Soil Placement Area. Rescreened soil with results greater than or equal to 50 ppm and visible/drainable free product was left staged on the Dewatering Pad. Representatives of the ACOE and the Ohio EPA were onsite during the North Soil Removal Area work to observe and assist with interpreting the field screening results. The North Soil Removal Area Excavated Soil flow chart is provided as Figure 1.

Sample collection, laboratory analysis, and results for the staged soil are discussed in Sections 2.10.2 and 2.10.3 Upper Surface Soil Placement Area stockpile testing of the Certification Report.

The North Soil Removal Area discussion is presented in three parts: slurry wall installation, soil excavation, and area restoration. A summary of the materials and equipment used, construction/installation methods, and CQA monitoring is presented for each of these activities. Brown and Caldwell's CQA

Monitor performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the North Soil Removal Area activities.

#### 2.8.1 Slurry Wall

Op-Tech excavated the trench for the slurry wall and Slurry Systems Inc., (SSI) of Gary Indiana constructed the slurry wall. The slurry was a Portland/slag cement-bentonite mixture. The completed slurry wall is 165.1 feet in length with the north wing wall 37.5 feet, the south wing wall 31.6 feet, and the back wall 96.0 feet in length. The top and bottom elevations of the slurry wall are as follows:

Wall Section	Eas	st End	Wes	West End		North		South		nter
	Тор	Bottom	Тор	Bottom	Тор	Bottom	Тор	Bottom	Тор	Bottom
North Wing Wall	602.3	591.4	606.1	594.9						
South Wing Wall	601.5	591.3	605.7	595.9						
Back (West) Wall					606.1	594.9	605.7	595.9	605.9	598.8

The bedrock was encountered at shallower depths than expected in the North Soil Removal Area.

The materials and equipment used (Section 2.8.1.1), construction/installation methods (Section 2.8.1.2), and CQA monitor observations (Section 2.8.1.3) for each of the Site Restoration and Closure activities are discussed in the following sections.

#### 2.8.1.1 Equipment and Materials

The materials used in the construction of the slurry wall were as follows:

- · Portland Type I-II cement; 100 pound bags.
- Slag cement; 100 pound bags.
- Sodium bentonite; 100 pound bags.
- Fritz Pak cement.
- Water supplied from a City of Elyria fire hydrant located on the west side of Ford Road.

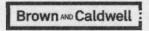
The slurry wall was constructed using the following equipment:

- Cat 320D excavator.
- Cat 725 articulated end dump.
- Cat TL1255 telehandler forklift.
- Mixing plant 700-gallon mixer with associated generator, pumps, and piping.
- · Various hand tools.

#### 2.8.1.2 Construction/Installation Methods

The following activities were performed for the construction of the slurry wall:

- The slurry wall centerline was marked in the field.
- Op-Tech used the Cat 320D excavator to excavate a three-foot wide trench to the depth of bedrock.



- o Trench sounding for the depth of the trench every 10 lineal feet.
- SSI mixed the slurry in the mixing plant with the following order of materials:
  - o Water.
  - o Cement additive.
  - o Bentonite.
  - o Portland cement.
  - o Slag cement.
- Sampling:
  - o Samples of the slurry mixture were collected twice per day.
  - o Samples from the slurry wall were collected every 100 lineal feet of wall.
  - o The results of the slurry wall testing are provided in Appendix I.
- As the excavation of the trench progressed, SSI pumped the slurry mixture from the mixing plant to the excavated trench through a pipeline.
- The slurry mixture was maintained, in the trench, at no less than 2 feet below the existing ground.
- The trench was excavated using a panel-by-panel methodology to aid in maintaining the slurry level in the trench.
- Excavated soils were loaded into a Cat 725 articulated end dump and hauled to the Dewatering Pad.
- At the end of the day, completed panels were topped off with slurry mixture to address any shrinkage due to stiffening of the wall.
- The following morning, all weep water was removed from the top of the slurry wall by pumping into the poly tank and the completed panels were topped off with slurry mixture.
- The new slurry wall panel was cut into the previous day's ending panel to begin construction of the next day's beginning panel.
- During the slurry wall installation, seeps were observed centrally located along the upper edge of
  the western slurry wall excavation. Following completion of this section of the slurry wall, an oily
  sheen was observed on top of the weep water. The origination point of the oily material was approximately 15 feet from the southern back corner along the top of the slurry wall. Based on discussions with U.S. EPA, the ACOE, and Ohio EPA, mitigation measures were implemented as follows:
  - At the direction of the Brown and Caldwell CQA Monitor, Op-Tech constructed a soil berm around the river end of the southern wing wall.
  - Absorbent booms were used to direct the weep water with the oily sheen to the end of the southern wing wall.
  - The weep water including the oily sheen was pumped to the poly tank and eventually to the Baker tank at the Upper Surface Area. The weep water with the oily sheen was observed throughout the day and pumped to the poly tank at a minimum at the end of each work day.

#### 2.8.1.3 CQA Monitoring

Field books were used to document activities in written format with photographs used to provide visual documentation. Daily Field Logs providing a summary of the slurry wall construction are provided in

Appendix A with photographs and a descriptive photograph log provided in Appendix B. The Brown and Caldwell CQA Monitor visually observed the construction of the slurry wall for workmanship and continuity including the following:

- Unloading of materials.
  - Monitored the unloading operations for dust issues and regulated the unloading activities if dust became an issue during unloading.
- Mixing of the slurry materials.
  - Monitored the mixing operations for dust issues and regulated the mixing activities if dust became an issue.
  - Collection of samples for performance of field and laboratory testing.
  - o Field testing performed by SSI.
- Trench excavation for location and depth.
  - o Performance of trench soundings.
- Loading and placement of excavated soils in the Dewatering Pad.
- The pumping of the slurry into the excavated trench.
- · Weep water removal.
- Keying in of the slurry wall to the previous day's slurry wall.
- Performed air monitoring and soil screening.
- Monitored the oily sheen on top of the weep water.
  - Adequate volume and height of the soil berm used to contain the weep water with the oily sheen.
  - Placement of the absorbent booms to direct the weep water with the oily sheen to the end of the southern wing wall.
  - Pumping the weep water with the oily sheen to the poly tank.

#### 2.8.2 Soil Excavation

The soil excavation was performed from the edge of the Black River between the north and south wing walls of the slurry wall to the western (back) wall of the slurry wall. The soil was removed down to the bedrock present within the limits of the North Soil Removal Area. Super sack sand bags were placed within the Black River as a barrier to 1) keep water from the Black River from entering the work area i.e. the soil removal area; 2) keep water from the excavation from entering the Black River; and 3) to provide an adequate work area at the river bank.

The surface area of the North Soil Removal Area was 4,126.2 square feet with 12.1 feet average excavation depth and 16.7 feet maximum excavation depth. The excavated soil volume was 1,844 cubic yards. Of this volume, 770.4 cubic yards of soil was transported to the Upper Surface Soil Placement Area, placed in a stockpile, and covered with plastic. The remaining 1,073.6 cubic yards of soil was placed in one of the two Lower Soil Placement Areas. The soil from the North Soil Removal Area segregated from the soil placed in the Upper Surface Soil Placement Area from the South Soil Removal Area

The soil excavation, screening, and soil placement location are discussed in the following sections of the Certification Report.

# 2.8.2.1 Materials and Equipment

The materials used in the North Soil Removal Area soil excavation were as follows:

- · Super Sack sand bags.
- Medium/coarse grain sand.
- 6-mil fire retardant 20x100 poly material.

The following equipment was used for the North Soil Removal Area soil excavation:

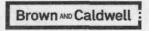
- · Cat D6 dozer.
- Cat 320D excavators.
- Cat 725 articulated end dumps.
- · Various hand tools.

### 2.8.2.2 Construction/Installation Methods

The following activities were performed for the North Soil Removal Area soil excavation:

- Super Sack sandbags (4-foot x 4-foot x 4-foot in dimension) were made by filling with medium to coarse-grained sand at the Upper Surface Area. The completed Super Sack sandbags were hauled to the North Soil Removal Area in the Cat 725 articulated end dumps for construction of the Black River barrier.
- Super Sack sandbags were placed two rows wide and one row high along the toe of the slope of
  the riverbank between the north and south wing walls of the slurry wall approximately 15 feet
  from the toe of the slope of the riverbank as a barrier to prevent river water from coming in on
  the excavation.
- A Cat D6 dozer stripped one foot of overburden from the soil excavation area.
- A Cat 320D excavator loaded the stripped soil into a Cat 725 articulated end dump and the soil
  was hauled and placed in the Lower Soil Placement Area or the Upper Surface Soil Placement
  Area depending on the results of the soil screening performed by the Brown and Caldwell CQA
  Monitor.
- Test pits were excavated with the Cat 320D excavator to pre-screen the soil for PCBs and VOCs.
   This provided an indication of where impacted soil was located both horizontally and vertically.
  - Eight test pits were excavated at depths ranging from three to seven feet.
  - The soil was screened using the PCB test kits and the PID.
- Soil excavation was performed as follows:
  - Excavation began at the northern edge of the soil removal area and progressed to the south.
  - Soil was excavated from the top of the slurry wall, at a 1:1 (H:V) slope to the bottom of the excavation i.e where bedrock was encountered to provide stability.
  - A two-foot strip of soil was left in place along the eastern edge of the soil removal area.
     This allowed Op-Tech to place a sump at the northeast corner of the excavation to pump water/liquid from the sump to the 500-gallon poly tank located west of the slurry wall, when needed.
  - Following completion of the soil excavation, Op-Tech excavated the two-foot strip of soil along the eastern edge of the excavation.

- As the soil excavation progressed, the Brown and Caldwell CQA monitor performed the following field screening procedures for each bucket of excavated soil:
  - o A small amount of soil was taken from the excavator bucket and placed in a Ziploc bag.
  - The PID monitoring tube was inserted into the bag and the soil was screened for VOCs with an action level of greater than or equal to 50 ppm.
    - For screening results that were less than 50 ppm VOCs and PCBs with no visible/drainable free product, the soil was placed in the Lower Soil Placement Area; if free product was observed, the soil was staged on the Dewatering Pad.
    - For screening results that were greater than or equal to 50 ppm VOCs, the soil was staged on the Dewatering Pad.
    - Accumulated soil was re-screened with the PCB test kits on the Dewatering Pad as follows:
      - Soil with results less than 50 ppm and no visible/drainable free product was hauled and placed in the Lower Soil Placement Area.
      - Soil with results greater than or equal to 50 ppm and no visible/drainable free product was hauled and staged in the Upper Surface Soil Placement Area.
      - Soil that continued to exhibit visible/drainable free product was left staged on the Dewatering Pad regardless of the re-screening results. This soil was screened with the PCB test kits when the visible/drainable free product was no longer present for placement in the Lower Soil Placement Area (less than 50 ppm) or staged in the Upper Surface Soil Placement Area (less than or equal to 50 ppm).
    - Soil excavated below the water table was staged on the Dewatering Pad, allowed to dewater, and was field screened to determine where to place/stage the soil.
    - The air monitoring and soil screening results recorded by Brown and Caldwell's CQA monitor are provided in Appendix J.
- Excavated soil was loaded in the Cat 725 articulated end dump and placed in either the Lower Soil Placement Area or the Upper Surface Soil Placement Area based on the screening results previously discussed.
  - Soil placed in the Upper Surface Soil Placement Area was covered with plastic; panels were overlapped a minimum of 12-inches and sand bags were placed along the panel overlaps and around the outside edges.
    - Soil from the North Soil Removal Area was segregated from the soil from the South Soil Removal Area when placed in the Upper Surface Soil Placement Area.
  - There was a Cat 725 articulated end dump dedicated for use at the North Soil Removal Area
  - One Cat 725 articulated end dump was dedicated to hauling to the Upper Surface Soil Placement Area and a second Cat 725 articulated end dump was dedicated to hauling to the Lower Soil Placement Area.
- Wet soil material was placed in the Lower Area Dewatering Pad and allowed to dewater and dry as much as practical.
- Soil placed in the Dewatering Pad was screened, as previously discussed, prior to being removed from the Dewatering Pad.
- Soil was excavated to bedrock.



### 2.8.2.3 CQA Monitoring

Daily Field Logs providing a summary of the North Soil Removal Area soil excavation activities are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The Brown and Caldwell CQA Monitor visually observed the North Soil Removal Area soil excavation for workmanship and continuity including the following:

- · Verified the depth of the excavation.
- · Proper handling and placement of the excavated soil.
  - Verified that the soil placed in the Upper Surface Soil Placement Area was covered with plastic and the plastic was properly anchored.
- Proper dewatering, screening, and placement of the wet excavated soil.
- Performed air monitoring and soil screening. A multi-gas meter and a PID were used to conduct
  the air monitoring. Atmospheric concentrations within the breathing zone were monitored for
  methane (LEL), hydrogen sulfide, oxygen, and VOCs. The PID and PCB test kits were used to
  conduct the soil field screening. The air monitoring and soil field screening results recorded by
  the Brown and Caldwell's CQA monitor are provided in Appendix J.

### 2.8.3 North Soil Removal Area Restoration

The restoration of the North Soil Removal Area consisted of backfilling the excavation with low permeability soil and constructing a riprap wall at the newly constructed riverbank.

### 2.8.3.1 Materials and Equipment

The materials used in the North Soil Removal Area restoration included the following:

- Low permeability soil, hydraulic conductivity (k) of 1 x 10-7 cm/sec.
- ODOT Type A riprap.

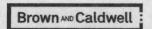
The North Soil Removal Area restoration was performed using the following equipment:

- Cat D6 dozer.
- Cat 320D excavators.
- Cat 725 articulated end dumps.
- Cat CP56 vibratory sheepsfoot compactor.
- Cat CS 433E vibratory smooth drum roller.
- Various hand tools.

### 2.8.3.2 Construction/Installation Methods

Restoration of the North Soil Removal Area consisted of placing and compacting the low permeability soil to the level of the adjacent ground surface around the excavation limits and construction of the riprap wall against the face of the low permeability soil at the riverbank. The following narrative provides a discussion of these two activities.

- Low Permeability Soil Backfill:
  - Low permeability soil (soil) was delivered to the Site and stockpiled.
  - Op-Tech loaded the soil into Cat 725 articulated end dumps with a Cat 320D excavator.
  - o The Cat 725 articulated end dumps hauled the soil to the North Soil Removal Area.
  - o The Cat D6 dozer pushed the soil into place, in uniform 12-inch loose lifts.
  - Op-Tech compacted each lift with the Cat CP56 vibratory sheepsfoot compactor with a minimum of five passes.



- o Prior to placing the next lift, Op-Tech scarified the top of the current lift.
- At the end of each day, Op-Tech sealed the current lift with the Cat CS 433E vibratory smooth drum roller.
- The soil was placed and compacted to the level of the adjacent ground surface.
- Riprap Wall Construction:
  - o ODOT Type A riprap (riprap) was delivered to the Site and stockpiled.
  - Op-Tech loaded the riprap into the Cat 725 articulated end dumps with the Cat 320D excavator.
  - The Cat 725 articulated end dumps hauled all of the riprap to the top of the riverbank and stockpiled the material.
  - The sand material present on the river bottom was moved with the Cat 320D excavator so the riprap pieces could "key" into the bedrock.
  - o The Cat 320D excavator was used to pick up and place individual pieces of riprap along the face of the low permeability soil. Each piece of riprap was manipulated with the excavator bucket to "lock" the pieces of riprap together.

### 2.8.3.3 CQA Monitoring

The Brown and Caldwell CQA Monitor visually observed the North Soil Removal Area restoration for workmanship and continuity. Daily Field Logs providing a summary of the North Soil Removal Area restoration activities are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during performance of the North Soil Removal Area restoration activities:

- Low Permeability Soil Backfill:
  - Verified that each lift of soil was free of loose material, foreign objects, rocks greater than three inches in maximum dimension, and standing water.
  - Verified the placement and uniformity of the lifts to a maximum uncompacted thickness of 12 inches.
  - Verified that the minimum number of five passes of the Cat CP56 vibratory sheepsfoot compactor.
  - Performed in-place density testing using a nuclear density gauge to verify acceptance of compaction of each lift as discussed in Section 2.8.3.4 of the Certification Report.
  - o Verified that the surface of each lift was scarified prior to placement of the next lift.
  - Verified that the surface of the top lift was sealed at the end of each workday and scarified at the beginning of each workday before additional soil was placed.
- Riprap Wall Construction:
  - o Verified the riprap was "keyed" into the bedrock.
  - Verified the thickness of the riprap wall.

### 2.8.3.4 Quality Assurance (QA) Testing

Field QA testing was performed for the off-site soil materials used in the North Soil Removal Area restoration. The minimum compaction specification for the off-site soil material was as follows:

• 95 percent of the maximum dry density with moisture content ±3% of optimum as determined by the Standard Proctor.

The Brown and Caldwell CQA monitor(s) performed the in-situ moisture/density testing using a nuclear density gauge for at least two tests per lift per acre in accordance with the CQAP prior to acceptance of the lift by the Brown and Caldwell CQA monitor(s). A total of 13 in-situ moisture/density tests were performed during the restoration of the North Soil Removal Area. The in-situ moisture/density test results are provided in Appendix G.

# 2.9 South Soil Removal Area

The South Soil Removal Area encompassed an area approximately 22 feet by 33 feet in dimension located in the floodplain midway between the north and south ends of the Site (see Project Record Drawing RD-11 for the location). Investigation performed as part of the Remedial Design determined that soils at this location were impacted with chlorinated solvents and should be excavated as part of the Phase I remediation.

Screening criteria for segregating the excavated soil was developed based on discussions with William T. Frederick of the ACOE and Demaree Collier of the U.S. EPA. A flow chart for the South Soil Removal Area excavated soil was developed to specify procedures for field screening of the soil with a PID. The flow chart established criteria for determining where the excavated soil would be staged at the Site.

Initial field screening was performed as the soil was excavated for gross contamination related to visible free product, presence of staining, strong hydrocarbon odors, and PID readings above 30 ppm. Soil with initial field screening results that were less than 30 ppm for VOCs with no visible/drainable free product was hauled and placed in the Lower Soil Placement Area. Soil with initial screening results less than 30 ppm for VOCs with free product was staged on the Dewatering Pad. Soil with field screening results greater than or equal to 30 ppm VOCs and no visible/drainable free product was hauled and placed in the Upper Surface Soil Placement Area. Soil with field screening results greater than or equal to 30 ppm VOCs with visible/drainable free product was placed on the Dewatering Pad to allow the soil to dewater before being re-screened and hauled and placed in the appropriate staging area depending on the PID results. The action level of 30 ppm was chosen for the South Soil Removal Area based on a comparison of the head space readings obtained during the site investigation activities and the laboratory vinyl chloride (VC) concentrations in the same locations. A concentration of 30 ppm correlates to a value of 6 milligrams per kilogram (mg/kg), which is the RCRA Universal Treatment Standard (UTS) for VC.

Representatives of the ACOE and the Ohio EPA were onsite during the South Soil Removal Area work to observe and assist with interpreting the field screening results. The South Soil Removal Area Excavated Soil flow chart is provided as Figure 2.

Sample collection, laboratory analysis, and results for the staged soil are discussed in Sections 2.10.2 and 2.10.3 Upper Surface Soil Placement Area stockpile testing of the Certification Report.

The South Soil Removal Area discussion is presented in two parts: soil excavation and area restoration. A summary of the materials and equipment used, construction/installation methods, and CQA monitoring is presented for each of these activities. Brown and Caldwell's field monitor performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the South Soil Removal Area activities.

# 2.9.1 Soil Excavation

The soil excavation was performed at the field surveyed location identified in the RDWP and shown on the Phase II Remedial Action construction drawings. The soil was removed down to the bedrock present within the limits of the South Soil Removal Area.

The surface area of the South Soil Removal Area is 1,071.8 square feet with 8.4 feet average excavation depth and 14.4 feet maximum excavation depth. The excavated soil volume is 333.1 cubic yards. Of

this volume, 90 cubic yards of soil was transported to the Upper Surface Soil Placement Area, placed in a stockpile, and covered with plastic. The remaining 243.1 cubic yards of soil was placed in one of the two Lower Soil Placement Areas. The soil from the South Soil Removal Area was segregated from the soil placed in the Upper Surface Soil Placement Area from the North Soil Removal Area.

The soil excavation, screening, and where the soil was placed is discussed in the following sections of the Certification Report.

### 2.9.1.1 Equipment

The following equipment were used for the South Soil Removal Area soil excavation:

- Cat 320D excavator.
- Cat 725 articulated end dumps.
- · Various hand tools.

### 2.9.1.2 Construction/Installation Methods

The following activities were performed during the South Soil Removal Area soil excavation:

- The limits of the excavation area were marked in the field.
- The Cat 320D excavator began excavation in the center of the South Soil Removal Area and progressed outward toward the excavation area limits.
- As the soil excavation progressed, the Brown and Caldwell CQA monitor performed the following field screening procedures for each bucket of excavated soil:
  - o A small amount of soil was taken from the excavator bucket and placed in a Ziploc bag.
  - The PID monitoring tube was inserted into the bag and the soil was screened for VOCs with an action level of greater than or equal to 30 ppm.
    - For field screening results that were less than 30 ppm VOCs with no visible/drainable free product, the soil was placed in the Lower Soil Placement Area; if free product was observed, the soil was staged on the Dewatering Pad.
    - For field screening results that were greater than or equal to 30 ppm VOCs with no visible/drainable free product, the soil was staged in the Upper Surface Soil Placement Area.
    - For field screening results greater than or equal to 30 ppm VOCs with visible/drainable free product, the soil was staged on the Dewatering Pad
    - Accumulated soil was re-screened with the PID on the Dewatering Pad as follows:
      - Soil with results less than 30 ppm and no visible/drainable free product was hauled and placed in the Lower Soil Placement Area.
      - Soil with results greater than or equal to 30 ppm and no visible/drainable free product was hauled and staged in the Upper Surface Soil Placement Area.
      - Soil that continued to exhibit visible/drainable free product was left staged on the Dewatering Pad regardless of the re-screening results. This soil was screened with the PID when the visible/drainable free product was no longer present for placement in the Lower Soil Placement Area (less than 30 ppm) or staged in the Upper Surface Soil Placement Area (less than or equal to 30 ppm).
    - Soil excavated below the water table was staged on the Dewatering Pad, allowed to dewater, and was field screened to determine where to place/stage the soil.



- The air monitoring and soil screening results recorded by Brown and Caldwell's CQA monitor are provided in Appendix J.
- Excavated soil was loaded in the Cat 725 articulated end dump and placed in either the Lower Soil Placement Area or the Upper Surface Soil Placement Area based on the screening results previously discussed.
  - Soil placed in the Upper Surface Soil Placement Area was covered with plastic; panels were overlapped a minimum of 12-inches and sand bags were placed along the panel overlaps and around the outside edges.
    - Soil from the South Soil Removal Area was segregated from the soil from the North Soil Removal Area when placed in the Upper Surface Soil Placement Area.
  - There was a Cat 725 articulated end dump dedicated for use at the South Soil Removal Area.
  - One Cat 725 articulated end dump was dedicated to hauling to the Upper Surface Soil
    Placement Area and a second Cat 725 articulated end dump was dedicated to hauling to
    the Lower Soil Placement Area.
- Wet soil material was placed in the Dewatering Pad and allowed to dewater and dry as much as practical.
- Soil placed in the dewatering pad was screened, as previously discussed, prior to being removed from the dewatering pad.
- The soil was excavated to bedrock.
- Following completion of the soil excavation, the bucket of the excavator was decontaminated in the Dewatering Pad. The decontamination water was pumped to the temporary treatment area at the Upper Surface Area. The decontamination water was sent to the City of Elyria WWTP (refer to Section 2.6).

### 2.9.1.3 CQA Monitoring

Daily Field Logs providing a summary of the South Soil Removal Area soil excavation activities are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The Brown and Caldwell CQA Monitor visually observed the South Soil Removal Area soil excavation for workmanship and continuity including the following:

- Verified the limits of the South Soil Removal Area marked in the field.
- Verified the depth of the excavation.
- Proper handling and placement of the excavated soil.
- Proper dewatering, screening, and placement of the wet excavated soil.
- Performed air monitoring and soil screening. A multi-gas meter and a PID were used to conduct
  the air monitoring. Atmospheric concentrations within the breathing zone were monitored for
  methane (LEL), hydrogen sulfide, carbon monoxide, oxygen, and VOCs. The PID was also used to
  conduct the soil screening. The air monitoring and soil screening results recorded by the Brown
  and Caldwell's CQA monitor are provided in Appendix J.

### 2.9.2 South Soil Removal Area Restoration

The restoration of the South Soil Removal Area consisted of backfilling the bottom three feet of the excavation with ODOT 57 aggregate and the rest with Steep Slope structural fill soil.

### 2.9.2.1 Equipment and Materials

The materials used in the restoration of the South Soil Removal Area were as follows:

- ODOT 57 aggregate.
- Steep Slope structural fill soil.

The South Soil Removal Area restoration was performed using the following equipment:

- Cat D6 dozer.
- Cat 320D excavators.
- Cat 725 articulated end dumps.
- Cat CP56 vibratory sheepsfoot compactor.
- · Various hand tools.

### 2.9.2.2 Construction/Installation Methods

The following activities were performed for the restoration of the South Soil Removal Area:

- ODOT 57 aggregate was delivered to the Site and stockpiled.
- Steep Slope structural fill soil (soil) was delivered to the Site and stockpiled.
- Op-Tech loaded the aggregate into the Cat 725 articulated end dumps with a Cat 320D excavator.
- The Cat 725 articulated end dumps hauled the aggregate to the South Soil Removal Area.
- The Cat 320D excavator placed the aggregate in the bottom of the excavation to a thickness of three feet.
- Op-Tech loaded the soil into Cat 725 articulated end dumps with a Cat 320D excavator.
- The Cat 725 articulated end dumps hauled the soil to the South Soil Removal Area.
- The Cat D6 dozer pushed the soil into place, in uniform 12-inch loose lifts.
- Op-Tech compacted each lift with the Cat CP56 vibratory sheepsfoot compactor with a minimum of five passes.
- Prior to placing the next lift, Op-Tech scarified the top of the current lift.
- The soil was placed and compacted to the level of the adjacent ground surface.

# 2.9.2.3 CQA Monitoring

The Brown and Caldwell CQA Monitor visually observed the South Soil Removal Area restoration for workmanship and continuity. Daily Field Logs providing a summary of the South Soil Removal Area restoration activities are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during performance of the South Soil Removal Area restoration activities:

- Verified that the bottom three feet of backfill material was ODOT 57 aggregate.
- Verified that each lift of soil was free of loose material, foreign objects, rocks greater than three inches in maximum dimension, and standing water.
- Verified the placement and uniformity of the lifts to a maximum uncompacted thickness of 12 inches
- Verified that the minimum number of five passes of the Cat CP56 vibratory sheepsfoot compactor.



- Performed in-place density testing using a nuclear density gauge to verify acceptance of compaction of each lift as discussed in Section 2.9.2.4 of the Certification Report.
- Verified that the surface of each lift was scarified prior to placement of the next lift.

### 2.9.2.4 Quality Assurance (QA) Testing

Field QA testing was performed for the off-site soil materials used in the South Soil Removal Area restoration. The minimum compaction specification for the off-site soil material was as follows:

 95 percent of the maximum dry density with moisture content ±3% of optimum as determined by the Standard Proctor.

The Brown and Caldwell CQA monitor(s) performed the in-situ moisture/density testing using a nuclear density gauge for at least two tests per lift per acre in accordance with the CQAP prior to acceptance of the lift by the Brown and Caldwell CQA monitor(s). A total of 10 in-situ moisture/density tests were performed during the restoration of the South Soil Removal Area. The in-situ moisture/density test results are provided in Appendix G.

# 2.10 Site Restoration and Closure

Site Restoration and Closure activities were performed from November 15, 2011 through December 17, 2011 including the following:

- Placement of soil material from the former North and South Soil Removal Areas in two Lower Soil Placement Areas above elevation 610 msl.
- Construction of a drainage swale outside the temporary berm to aid in surface water control.
- Planting willow stakes at the top of the riprap placed along the riverbank at the former North Soil Removal Area.
- Vegetation of disturbed areas with temporary seed mix by hydroseeding with wood fiber hydro mulch including tackifier and straw.
- Upper Surface Soil Placement Area stockpile testing.
- Op-Tech demobilization from the Site.
- Placement of additional riprap along the riverbank at the former North Soil Removal Area from May 7, 2012 through May 10, 2012.

The materials and equipment used (Section 3.10.1), construction/installation methods (Section 3.10.2), and CQA monitor observations (Section 3.10.3) for each of the Site Restoration and Closure activities are discussed in the following sections.

### 2.10.1 Materials and Equipment

The materials used in the performance of the Site Restoration and Closure activities included the following:

- Lower Soil Placement Areas:
  - o 6-mil Fire Retardant 20x100 Poly Material.
  - o Silt fence.
- Drainage Swale Construction:
  - o Silt fence.
  - o Straw bales.
- Willow Stake Planting:



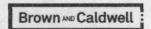
- o 500 Streamco willows.
- o 400 Pussy willows.
- o 400 Black willows.
- · Vegetation:
  - o Firelands "Highway Median" Lawn Seed Mixture consisting of the following:
    - Fawn Tall Fescue.
    - Perennial Ryegrass VNS.
    - Kentucky Bluegrass VNS.
  - Temporary seed consisting of the following:
    - Ryegrass
  - Hydro Mulch 2000 wood fiber with tackifier.
  - o Wheat straw.

The product information and data for the seed mixes and the mulch are provided in Appendix E with silt fence information and data also provided in Appendix E.

- Additional Riprap:
  - o ODOT Type A riprap.
  - o 6 oz. non-woven geotextile.

Equipment used in the performance of the Site Restoration and Closure activities included the following:

- Lower Soil Placement Areas:
  - o Cat 320D excavator.
  - o Cat D6 dozer.
  - o Cat 725 articulated end dump.
- Drainage Swale Construction:
  - o Cat 320D excavator.
  - o Cat D6 dozer.
  - o Various hand tools.
- Willow Stake Planting:
  - o Cat 320D excavator.
  - o Various hand tools.
- Vegetation:
  - o Kobelco 13SR Gate Keeper mini-excavator.
  - o Turf Maker hydroseeder on a dual-axle trailer.
  - o Cat D6 dozer.
  - o Various hand tools.
- Upper Surface Soil Placement Area stockpile testing:
  - o Sample containers and cooler.
  - o Stainless steel spoon.
  - o Stainless steel mixing bowls.



- o Plastic gloves.
- Additional Riprap:
  - o Cat 320D excavator with a claw attachment.
  - o Cat 725 articulated end dump.
  - o Various hand tools.

# 2.10.2 Construction/Installation Methods

Brown and Caldwell's CQA monitor(s) provided oversight and documentation of the Site Restoration and Closure activities as presented in Section 2.10.3 of the Certification Report. The following sections of the Certification Report provide discussions of the construction/installation methods performed for each of the Site Restoration and Closure activities.

Lower Soil Placement Areas

Two areas located along the toe of the Steep Slope Area (see Project Record Drawing RD-03 for location) were used to place soil material excavated from the former North and South Soil Removal Areas. This soil material was screened by the Brown and Caldwell CQA Monitor for placement in the Lower Placement Area.

- Soil was moved/graded with the Cat D6 dozer or placed with the Cat 320D excavator from the temporary storage areas within the limits of the temporary berm to the southern Lower Soil Placement Area.
- Soil was loaded into the Cat 725 articulated end dump trucks and transported to the northern Lower Soil Placement Area.
- The soil in each Lower Soil Placement Area was graded up the slope with the Cat D6 dozer.
- The 6-mil poly material was placed over the soil perpendicular to the slope. Panels were overlapped a minimum of 12-inches. Landscape staples and sand bags were placed along the panel overlaps and around the outside edges.
- Silt fence was installed at the toe of the slope along the bottom of each Lower Soil Placement Area.
- Drainage Swale Construction

Throughout the performance of the Phase I Remedial Action implementation activities, standing/accumulated water was present to the south and southwest of the South Access Road and location of the berm. During and following storm events, water from the storm and flooding of the Black River would increase in these areas and flow up against the South Access Road and the partially constructed berm. A drainage swale was constructed to provide a pathway for the standing/accumulated water to flow away from the South Access Road and the partially constructed berm during the winter and early spring of 2011/2012 following the winter shutdown.

- The swale was excavated with the Cat 320D excavator between the silt fence to the south and the toe of the partially constructed berm.
  - The swale runs from the southern end of the berm to the northeast to a naturally-occurring outlet location leading to the Black River.
  - The excavated soil was placed in the temporary storage area within the limits of the temporary berm, which was placed in one of the Lower soil Placement Areas.
- The silt fence and straw bales were installed across the outlet to control potential sediment from entering the river.

### Willow Stake Planting

Willow stakes, approximately three feet in length, were planted along the top of the riprap riverbank stabilization adjacent to the former North Soil Removal Area.

- o An angular trench was excavated to an approximate depth of 18 inches along the top and behind the riprap.
- The willow stakes were placed on an approximate 45° angle with six to 12 inches of the stakes extending out above the riprap material.
- Soil from the excavation was placed on top of the willow stakes in the trench and lightly compacted with pressure from the excavator bucket.

### Vegetation

Vegetation of the disturbed areas was performed using a temporary seed mix conducive to the climate conditions (cold temperatures and potential freezing) at the time the work was shutdown for the winter. Use of the temporary seed mix in lieu of the Steep Slope Seed Mix and permanent seeding was discussed between the U.S. EPA, Ohio EPA, the Settling Parties Site Coordinator, and Brown and Caldwell. The decision was made to use the temporary seed mix in an attempt to establish vegetation of the disturbed areas in as fast a manner as possible. The ryegrass and perennial ryegrass are considered quick germinating grasses, which are often used to establish vegetation outside of the optimum seeding periods.

- o Finish grading of the disturbed areas was performed.
- o The seed, fertilizer, and Hydro Mulch were loaded with water into the hydroseeder.
- o The hydroseeder was pulled with the Cat D6 dozer from the north end of the disturbed area (in proximity to the former North Soil Removal Area) to the south.
- The seed/fertilizer/Hydro Mulch/water slurry was sprayed onto the disturbed ground.
- o A small area to the north of the former North Soil Removal Area was inaccessible to the hydroseeder. This area was broadcast seeded by hand and covered with wheat straw.
- Upper Surface Soil Placement Area stockpile testing:

Samples of the soil staged in the Upper Surface Soil Placement Area were collected following the agreed upon sampling procedures presented in the Field Sampling Plan of the approved RDWP and RAWP for the Site. In accordance with the RAWP, samples were collected for laboratory analysis to determine the concentrations of the constituents of concern (COCs) in the staged soil. The analytical results were used to determine if the staged soil could remain onsite for placement under the final cover system cap during performance of the Phase II Remedial Action implementation or if the staged soil would need to be transported to an off-site licensed disposal facility permitted to accept the soil. The analytical results are discussed in Section 3.10.3 and the soil sampling procedures are presented as follows:

- A cooler with sample containers and chain-of-custody was delivered to the Site from Test America of North Canton, Ohio.
- Perform a QC check of the sample containers i.e. proper number, size, and preservatives, if required.
- Calculate the approximate volume of soil in each stockpile. This determined the number of samples collected.
- o Divided the stockpiles into sections of approximately equal volume.
- Collect discreet subsamples from the bottom third, middle third, and top third of the sections.



- Subsamples were collected from a depth greater than one foot below the surface of the stockpile and the subsamples were of equal volume.
- O Subsamples for each section were combined in a stainless steel bowl and thoroughly mixed together with a clean stainless steel spoon.
- o Transferred an adequate volume of the composite sample into the sample containers.
- Label and sealed the sample containers.
- Placed the sample containers in the cooler with ice for shipment to the laboratory using chain-of-custody protocols.
- Shipped the coolers to the laboratory for analysis of PCBs (EPA 8082) and/or VOCs (EPA 8260).

A representative of the Ohio EPA was present to observe the collection and preservation of the staged soil samples.

#### Demobilization

- Op-Tech disconnected the utilities and removed the office trailer, Conex box, and diesel fuel tank from the Site.
- Op-Tech and Op-Tech's subcontractors removed equipment and ancillary items from the Site.
- A final site walkthrough was performed on December 17, 2011 by the Brown and Caldwell CQA monitor to check the integrity of the silt fence and straw bales along the Black River floodplain and the overall cleanliness of the Site.

### Additional Riprap

Based on observations made during visits to the Site through the winter 2011 and early spring 2012, the slope (angle) of the riprap wall constructed along the Black River as part of the former North Soil Removal Area restoration did not appear to be correct. The slope angle at the top of the riprap wall and base of the Soil Buttress determined where the Soil Buttress would intersect with the crest of the existing landfill in this area. If the slope was too flat, the Soil Buttress could potentially intersect the landfill slope below the existing crest of the landfill. If this scenario occurred, the Soil Buttress would have cut into the existing waste near the crest of the landfill, which was not part of the approved Phase II Remedial Action implementation.

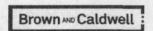
- o Op-Tech mobilized personnel and equipment to the Site.
- o ODOT Type A riprap (riprap) was delivered to the Site and stockpiled.
- Op-Tech loaded the riprap into the Cat 725 articulated end dumps with the Cat 320D excavator.
- The Cat 725 articulated end dumps hauled all of the riprap to the top of the existing riprap wall and stockpiled the material.
- OP-Tech removed the soil at the top of the existing riprap wall and willow stakes; these
  materials were placed to the side for reuse.
- Straub Surveying, LLC (Straub) of Rocky River, Ohio field surveys the slope for the additional riprap placement.
- The sand material present on the river bottom was moved with the Cat 320D excavator so the riprap pieces could "key" into the bedrock.
- The Cat 320D excavator was used to pick up and place individual pieces of riprap along the face of the existing riprap wall. Each piece of riprap was manipulated with the excavator bucket to "lock" the pieces of riprap together.

- Op-Tech places the geotextile over the riprap and then places approximately 1-1/2 feet of soil on the geotextile.
- Straub returns to the Site to check the slope (angle) of the riprap, which is determined to be correct; however, a couple areas were below the proposed elevation
  - Op-Tech added additional riprap, which Straub verified to be at the correct elevation.
- o Op-Tech replants the willow stakes at the top of the riprap wall.
- Op-Tech performs finish grading in the area, replaces the silt fence, and demobilizes from the Site.

# 2.10.3 CQA Monitoring

Brown and Caldwell's CQA monitor(s) visually observed the Site Restoration and Closure activities for workmanship and continuity. The Site Restoration and Closure activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the Site Restoration and Closure activities are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during performance of the Site Restoration and Closure activities:

- Lower Soil Placement Areas
  - Verified the soil was uniformly spread up and across the slope.
  - o Proper placement and overlap of the poly material panels.
  - o Proper anchoring of the poly material.
  - o Silt fence was properly installed and in the correct location.
- Drainage Swale Construction
  - o Verified horizontal and vertical location.
  - o Verified proper width and depth.
  - Verified proper installation of straw bales and silt fence.
  - Verified that the swale was free of obstructions and foreign objects following completion of construction.
- · Willow Stake Planting
  - o Proper trench location and depth.
  - o Proper placement of the willow stakes in the trench.
  - o Proper backfilling of the trench.
- Vegetation
  - The final surface of the disturbed areas were ready for vegetation.
  - Collected seed tags and fertilizer information to confirm type and quantity of materials used. Example seed tag, fertilizer, and Hydro-Mulch information is provided in Appendix K.
  - The proper quantities of seed and fertilizer were loaded with water into the hydroseeder.
  - The seed/fertilizer/water slurry was sprayed evenly across the areas to be vegetated.
  - Proper broadcast seeding and coverage with wheat straw for the small area to the north of the former North Soil Removal Area.



- Upper Surface Soil Placement Area stockpile testing:
  - Perform a QC check of the sample containers i.e. proper number, size, and preservatives, if required.
  - o Verified the soil volume calculations for each stockpile.
  - Verified the proper division of the stockpiles.
  - o Verified the proper sampling procedures were performed.
  - o Verified the sample containers were properly labeled and sealed.
  - o Verified the chain-of-custody was properly filled out, signed, and dated.
  - Verified the cooler was properly packed with containers wrapped to prevent breakage and chain-of-custody was placed in a resealable bag in the cooler.
  - Verified the cooler was properly sealed, chain-of-custody tags were in place, and the laboratory address was correct.

The composite samples from the staged soil stockpile from the North Soil Removal Area were collected and submitted for analysis of PCBs (target limit of 50 mg/kg) on November 9, 2011 to determine if the soil needed to be disposed offsite or could remain onsite under the Upper Surface Area final cover system cap. The analytical results for the composite samples were well below the target limit of 50 mg/kg with only one sample result exceeding 1 mg/kg for PCBs. These results verified that the PCB test kits used in the soil screening for the North Soil Removal Area were overly conservative. The analytical results for the North Soil Removal Area soil stockpile samples are provided in Appendix H.

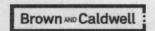
The composite samples from the staged soil stockpile from the South Soil Removal Area were analyzed for VOCs and TCLP volatiles to determine if the soil needed to be disposed offsite or could remain onsite under the Upper Surface Area final cover system cap. The first sample was obtained on November 15, 2011, just after the soils were transported and placed in the Upper Surface Soil Placement Area. The analytical results for this sample showed a TCLP concentration of Vinyl Chloride (VC) that was slightly above the hazardous characteristic limit for VC. The staged soil stockpile was divided into four sub-piles and each sub-pile was resampled on December 13, 2011 to determine if off-site disposal was required for the entire soil stockpile. Samples collected from the four sub-piles were analyzed using the same composite sampling procedures described in Section 3.9.2 of the Certification Report.

The analytical results for the four sub-pile composite samples were below the TCLP limit for all compounds; including VC. Based on these follow-up results, the staged soil from the South Soil Removal Area was not characteristically hazardous and was not required to be transported for off-site disposal. The analytical results for the South Soil Removal Area soil stockpile samples are provided in Appendix H.

Representatives of the Ohio EPA were present to observe and assist with the sampling events. The analytical results for each of the sampling events were provided to the U.S. EPA and the ACOE on January 31, 2011 with confirmation of the results and disposition of the soils in the stockpiles to be left onsite received from William T. Frederick of the ACOE and Demaree Collier of the U.S. EPA in e-mails dated January 31, 2011. The staged soil stockpiles were graded in place and covered with plastic including sand bag anchors. The graded soil was covered by the Upper Surface Area final cover system cap constructed as part of the Phase II Remedial Action implementation (see Section 3.9 of the Certification Report).

### Demobilization

 Verified utilities disconnection and removal of the office trailer, Conex box, and diesel fuel tank from the Site.



- Observed Op-Tech and Op-Tech's subcontractors' equipment and ancillary items removal from the Site.
- O Documented the final site walkthrough performed on December 17, 2011 by the Brown and Caldwell CQA monitor to check the integrity of the silt fence and straw bales along the Black River floodplain and the overall cleanliness of the Site. No issues were identified during the walkthrough and the Phase I Remedial Action work was shutdown.

# Additional Riprap

- o Verified the thickness of the riprap wall.
- Verified the ODOT Type A riprap as correct material.
- Observed the soil and willow stakes removal including proper storage for reuse.
- Observed Straub field surveying to set the slope of the additional riprap; concurrence with the field survey.
- o Verified the riprap was "keyed" into the bedrock.
- Verified the thickness and elevation of the riprap wall.
- Observed the placement of the geotextile over the riprap and verified the thickness of soil on the geotextile.
- o Concurs with Straub's check of the slope (angle) of the riprap.
- Verifies placement of additional riprap in low areas and concurrence with Straub's verification of the correct elevation.
- o Observes the willow stake replanting.
- Verified Op-Tech's performance of the finish grading, replacement of the silt fence, and demobilization from the Site.
- Performed a final site walkthrough to check the integrity of the silt fence and straw bales along the Black River floodplain and the overall cleanliness of the Site. No issues were identified during the walkthrough.



# Section 3

# **Phase II Construction**

The Phase II construction completed the Remedial Action implementation at the Site including completion of the Sedimentation Basin and the South Access Road; both started as part of the Phase I construction (refer to Section 2 of the Certification Report). The Phase II Remedial Action Implementation included the Steep Slope Area Soil Buttress installation from the Black River flood plain to the top of the landfill slopes, re-grading of the Upper Surface Area of the Site and construction of the final cover system cap, construction of the North and South Access Roads, construction of the Ford Road Culvert Outlet Channel, and installation of groundwater monitoring wells that were abandoned during Phase I construction.

The Phase II construction was performed from May 29, 2012 to October 26, 2012 and on the following dates for performance of the following activities:

- November 13, 2012 Planting of the willow stakes from the southern end of the riprap at the former North Soil Removal Area to the south for approximately 280 feet within the Black River floodplain.
- November 20, 2012 Precision Paving, a subcontractor to Haynes, made repairs to the identified sections of Ford Road.
- January 7, 2013 and January 15, 2013 Inline Fence, a subcontractor to Haynes, installed the gates and fence sections at the north and south Site access roads.

The Phase II Remedial Action implementation included the performance of the following activities:

- · Quality Control (QC) Information/Testing for proposed materials.
- · Contractor Mobilization.
- · Site Preparation.
- Completion of the South Access Road.
- North Access Road.
- · Completion of the Sedimentation Basin.
- Steep Slope Area Soil Buttress.
- Upper Surface Area Final Cover System Cap.
- Ford Road Culvert Outlet Channel.
- Site Restoration and Closure.

A discussion of the materials and equipment, construction/installation methods, CQA monitoring, and tests performed for each of the Phase II Remedial Action implementation activities is presented in the following sections of the Certification Report. Alterations/modifications from the approved Phase II construction drawings were implemented in the field and are discussed including agreements and approvals obtained from the U.S. EPA.

# 3.1 Phase II Alterations/Modifications

During the course of the Phase II Remedial Action implementation activities, alterations/modifications from the construction drawings were implemented in the field. The alterations/modifications were



discussed with the U.S. EPA to obtain agreement/approval before implementing the alterations/modifications in the field. These alterations/modifications are listed below, and are reflected on the Project Record Drawings included in Appendix D:

- The soil samples from the Camp Wahoo borrow source were tested for Modified Proctor. As required by the specifications, compaction testing was performed based on the Standard Proctor. Soil samples from the Camp Wahoo borrow source were tested for compaction using 95 percent of the maximum dry density as determined by the Modified Proctor. All soil samples exceeded the required standard.
- The orientation of the Sedimentation Basin principal spillway outlet apron was changed by rotating the apron check dam 45 degrees toward the flared end section. This modification will allow the discharge water to be directed toward the diversion channel that directs surface water to the Black River along the exterior slope of the Sedimentation Basin berm.
- The design required removal of trees along Ford Road for construction of the Upper Surface Area final cover system. The decision was made in consultation and agreement by the U.S. EPA, Ohio EPA, the Settling Parties Site Coordinator, and Brown and Caldwell to leave trees along Ford Road for aesthetic purposes. The Upper Surface Area final cover system design was modified to minimize the removal of trees along Ford Road.
- Extra Type D ODOT aggregate, used at the upper reach of the Ford Road Culvert Outlet Channel (Channel), was placed in the drainage channel/swale upgradient and to the west of the concrete headwall at the beginning of the Channel. This modification was made to aid in controlling potential erosion and sediment issues in this drainage channel/swale resulting from surface water flowing in the east roadside ditch along Ford Road.
- The type of fence sections and gates was changed from chain link with 3-strands of barbed wire
  to double bar gates and tube rail fence sections (see Appendix B for photographs of the installed
  fence sections and gates). This modification was proposed to, and approved by U.S. EPA. This
  modification was made for aesthetic purposes.
- At the request of U.S. EPA, the Army Corps of Engineers, and Ohio EPA, willow stakes were procured and planted by Brown and Caldwell from the southern end of the riprap wall at the former North Soil Removal Area to the south for approximately 280 feet within the Black River floodplain. Large rocks were also placed against the toe of the Soil Buttress in this area.

# 3.2 Quality Control (QC) Information/Testing

Quality Control (QC) information and testing was performed to confirm that the materials proposed for use in the construction/installation were in conformance with the specifications and the CQAP. Haynes provided the required QC information and/or laboratory test results for the proposed materials to Brown and Caldwell for review in the form of submittals. Brown and Caldwell reviewed the submittal information to check conformance of the proposed materials with the specifications and the CQAP. The submittals were returned to Haynes with one of the following four items indicated:

- No Exception Taken;
- Make Corrections Noted (Re-submittal Not Required);
- Revise and Re-Submit (Re-submittal Required); or
- Rejected See Remarks

Once the submittals were revised and determined to be in conformance with the specifications and the CQAP, approval was provided to Haynes for the delivery of materials to the Site.

The following QC information and testing was performed by Haynes for materials used in the Phase II Remedial Action Implementation:

- Information submittals:
  - o Non-woven geotextile fabric;
  - o Netpave® 50 interlocking grids;
  - o Corrugated metal pipe (CMP) principal spillway;
  - o Silt fence:
  - o Wattle materials:
  - o Flexible Growth Medium (FGM) HP-FGM materials;
  - o Chain link fence and gates;
  - o Permanent seed mix;
  - Steep slope seed mix;
  - o HDPE pipe; and
  - o Turf Reinforcement Mat (TRM) materials.
- Information and laboratory test results submittals:
  - o ODOT 304 Aggregate;
  - ODOT 411 Aggregate;
  - o Riprap materials;
    - ODOT Type A Black River riprap face;
    - ODOT Type B Downchute channel receiving basin;
    - ODOT Type C Principal spillway riprap outlet apron; and
    - ODOT Type D Ford Road culvert outlet channel and Sedimentation Basin rock check dams.
  - Peastone Sedimentation Basin rock check dams and Drivable Drainage Channel;
  - Construction entrance aggregate; and
  - o ODOT 57 aggregate.

Brown and Caldwell reviewed each of the submittals previously listed and determined the materials to be in conformance with the specifications and the CQAP. The results of the submittal reviews are provided in Appendix E.

# 3.2.1 Off-Site Borrow Soil Testing

Brown and Caldwell performed QA testing for soil samples from two potential off-site borrow sources and provided direction to Haynes for collection of soil samples from a third potential off-site borrow source. The purpose of this sampling program was to find suitable soil material for use as structural fill soil for the Soil Buttress and the Upper Surface Area final cover system cap. The soil samples for each of the three potential off-site borrow sources were transported to S&ME, formerly BBC&M, for analysis at the geotechnical laboratory either in Dublin, Ohio or in Valley View, Ohio. The samples were transported and delivered to the laboratory under chain-of-custody protocols.

The off-site borrow sources were the stockpile located behind the Metro Parks Service Maintenance Garage, Camp Wahoo, and the Grobe Fruit Farm. The sampling and laboratory analysis for each of these off-site borrow sources is discussed in the following sections.

### 3.2.1.1 Metro Parks Service Soil Stockpile

Brown and Caldwell collected five representative soil samples in February 2010 and one representative soil sample in December 2011, March 2012, and May 2012. The soil samples were submitted to S&ME for performance of the following geotechnical laboratory tests:

- Moisture content:
- Unified soil classification;
- · Atterberg Limits;
- Sieve and hydrometer;
- Organic content;
- Standard Proctor;
- Modified Proctor: and
- Strength testing (Direct Shear).

The laboratory tests are summarized in Table 1 and the laboratory test results are provided in Appendix H.

Based on the geotechnical test results, the soil available from the Metro Parks Service Maintenance Garage stockpile was suitable for use as general fill material and in the Soil Buttress.

### 3.2.1.2 Camp Wahoo Borrow Source

The Camp Wahoo potential borrow source is located off of State Route 611 in Elyria, Ohio approximately eight miles west of the Site. Nineteen total representative soil samples were collected by Brown and Caldwell and delivered to Brown and Caldwell for submittal to S&ME in December 2011 (three samples), one sample in March 2012, and May 2012 (15 samples). The soil samples were submitted to S&ME for performance of the following geotechnical laboratory tests:

- Moisture content;
- Unified soil classification;
- Atterberg Limits;
- Sieve and hydrometer;
- Organic content;
- Standard Proctor;
- Modified Proctor;
- Strength testing (Direct Shear); and
- Permeability.

The laboratory tests are summarized in Table 1 and the laboratory test results are provided in Appendix M.

Based on the geotechnical test results, the soil available from Camp Wahoo was suitable for use as general fill material, the Soil Buttress, and the Upper Surface Area final cover system cap.

Three representative samples of topsoil were also collected by Haynes and delivered to Brown and Caldwell for submittal to S&ME in June 2012. The topsoil samples were submitted to S&ME for performance of the following geotechnical laboratory tests:

- Moisture content;
- Unified soil classification;
- Atterberg Limits;



- · Sieve and hydrometer; and
- · Organic content.
- pH.

The laboratory tests are summarized in Table 1 and the laboratory test results are provided in Appendix M.

Due to low pH test results (< 6), Topsoil from the Camp Wahoo borrow source was not suitable for use at the Site. The topsoil was obtained from the Grobe Fruit Farm borrow source.

### 3.2.1.3 Grobe Fruit Farm Borrow Source

The Grobe Fruit Farm potential borrow source is located off of Telegraph Road in Elyria, Ohio approximately five miles west of the Site. Six representative soil samples were collected by Haynes and delivered to Brown and Caldwell for submittal to S&ME in June 2012. The soil samples were submitted to S&ME for performance of the following geotechnical laboratory tests:

- Moisture content;
- · Unified soil classification;
- · Atterberg Limits;
- Sieve and hydrometer;
- Organic content;
- Standard Proctor;
- Modified Proctor;
- Strength testing (Direct Shear); and
- Permeability.

The laboratory tests are summarized in Table 1 and the laboratory test results are provided in Appendix M.

Based on the geotechnical test results, the soil available from the Grobe Fruit Farm was suitable for use as general fill material and in the Soil Buttress.

Two representative samples of topsoil were collected by Haynes and delivered to Brown and Caldwell for submittal to S&ME in June 2012. The topsoil samples were submitted to S&ME for performance of the following geotechnical laboratory tests:

- Moisture content;
- Unified soil classification;
- Atterberg Limits;
- · Sieve and hydrometer; and
- Organic content.

One representative sample of topsoil was collected by Haynes and submitted to Sunrise Coop/Norwalk AG Branch on October 3, 2012 for performance of the following geotechnical laboratory tests:

pH.

The laboratory tests are summarized in Table 1 and the laboratory test results are provided in Appendix M.

Based on the geotechnical test results, the topsoil available from the Grobe Fruit Farm was suitable for use at the Site.

### 3.2.1.4 Off-Site Soil and Topsoil Volumes

The volume of off-site soil and topsoil used in the Phase II Remedial Action implementation is as follows:

- · Off-Site Soil:
  - o Sedimentation Basin Berm: 6,530 cubic yards.
  - o Steep Slope Area Soil Buttress: 77,542 cubic yards.
  - o Upper Surface Area Final Cover System Cap: 24,283 cubic yards.
- Off-Site Topsoil: 3,170 cubic yards.

# 3.3 Contractor Mobilization

In order to take advantage of weather conditions in the Elyria area, Haynes asked permission to initiate Work for the Phase II Remedial Action implementation before the date of the Pre-Construction Meeting on June 4, 2012. Discussions with Haynes, Brown and Caldwell, Steerman Environmental Management and Consulting (Steerman Environmental), and the U.S. EPA determined non-evasive Work could be initiated before the Pre-Construction Meeting was held on June 4, 2012. The U.S. EPA approved the following Work activities:

- Mobilization of the office trailer and setting up/connection of utilities.
- Installation of fence sections and gates at the Site entrances.
- Installation of silt fence and erosion controls.
- · Stockpiling of soil material for construction.
- Clearing of trees and vegetation along the steep slopes.
- · Continued Work to complete the Sedimentation basin berm.

Haynes initiated Work for the following activities before the Pre-Construction Meeting:

- Haynes clearing subcontractor mobilized equipment to the Site and began tree clearing along the
  crest of the Steep Slope Area and chipping of the cleared material.
- Haynes mobilized the office trailer and equipment to the Site.
- Haynes constructed the northern construction entrance to provide access to the North Access
   Road from Ford Road as discussed in Section 3.4.2 of the Certification Report.

Brown and Caldwell provided field CQA monitoring of the Work and provided summaries of the Work to Steerman Environmental who forwarded the summaries to the U.S. EPA.

Haynes mobilized to the site on May 29, 2012 to start setting up operations to perform the Phase II Remedial Action implementation. Various types and pieces of equipment were mobilized and demobilized to and from the site throughout the performance of the Phase II Remedial Action implementation activities and this equipment is discussed in the appropriate sections of the Certification Report. The following provides a list of resources and equipment mobilized to the site to begin the Phase II Remedial Action implementation activities:

- Portable office trailer.
- 4-wheel drive, crew cab, pickup trucks.
- Portable sanitary toilet.
- Personnel.
  - o Site supervisor.
  - Equipment operators.



#### o Laborers.

The portable sanitary toilet was serviced weekly and trash produced by the jobsite personnel was placed in trash receptacles at the Site office trailer. Only non-hazardous solid wastes were placed in the receptacles. The trash was taken by Haynes to their office in Norwalk, Ohio and placed in a dumpster supplied by Allied Waste (Republic Services, Inc.). The dumpster was emptied and the waste transported to the Lorain County II Landfill in Oberlin, Ohio (an Ohio EPA permitted solid waste facility) for off-site disposal.

# 3.4 Site Preparation

Site preparation activities included the following:

- Erosion and Sediment Control.
- Temporary Construction Entrances.
- Site Clearing and Grubbing.

# 3.4.1 Erosion and Sediment Control

Erosion and sediment control for the Site included silt fence and straw bales installed at the limits of disturbance and along the Black River floodplain. Haynes was responsible for maintenance of the new and existing erosion and sediment controls throughout the Phase II Remedial Action implementation.

Brown and Caldwell prepared a Storm Water Pollution Prevention Plan (SWP3) for the Site under the requirements of Ohio EPA Permit No. OHCOOOOO3 – Authorization for Storm Water Discharges Associated with Construction Activity under the National Pollutant Discharge Elimination System (NPDES). The erosion and sediment control structures were provided and installed following the provisions of the Ohio Department of Natural Resources (ODNR), Division of Soil and Water Conservation, Rainwater and Land Development – Ohio's Standards for Stormwater Management, Land Development, and Urban Stream Protection, Third Edition 2006. An erosion and sediment inspection was performed at least weekly and following storm events.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the erosion and sediment control structures installation. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.4.1.1), construction/installation methods (Section 3.4.1.2), and CQA monitoring (Section 3.4.1.3) performed during installation of the erosion and sediment control structures. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC requirements for materials and installation methods is provided in appendices as noted within each section of the erosion and sediment control discussion.

### 3.4.1.1 Materials and Equipment

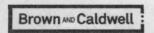
The erosion and sediment control materials installed at the Site included the following:

• Silt fence - LS 125 Fabric, 30-inch x 100-foot rolls; 1-1/2" x 1-1/2" x 36" (nominal) oak stakes on 10-foot centers.

Product information for the silt fence material is provided in Appendix E.

Equipment used for the silt fence installation included the following:

- Kobelco 235 SRLC Excavator.
- · Various hand tools.



### 3.4.1.2 Construction/Installation Methods

Haynes maintained the silt fence from the Phase I Remedial Action implementation and, if required, replaced, the silt fence sections and straw bales.

The following methods were used to install/replace the silt fence:

- Excavated a minimum six-inch deep anchor trench.
- Unrolled silt fence panels and placed the silt fence, with the posts on the downslope side of the fabric, in the trench, leaving at least 16 inches of silt fence material above the original ground surface.
- Pulled the stakes tight and pounded the stakes into the ground at the backside of the trench.
- Seams between silt fence panels were overlapped a minimum of six inches and the end posts of each panel were wrapped together before the stakes were pounded into the ground.
- Backfilled the trench with the excavated soil.

### 3.4.1.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the construction/installation of the erosion and sediment control structures for workmanship and continuity. The construction/installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the erosion and sediment control structures installation are provided in Appendix A with the installation photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during installation of the erosion and sediment control structures:

- Proper location and anchor trench depth.
- · Placement of the silt fence in the anchor trench.
- · Proper height of silt fence above the original ground surface.
- No sagging of the silt fence fabric between stakes.
- Proper overlap between seams of silt fence panels.
- Proper backfilling of the anchor trench.

The Brown and Caldwell CQA Monitor performed the soil erosion and sedimentation control inspections weekly and within 24 hours of storm events. Copies of the soil erosion and sedimentation control inspection forms are provided in Appendix F.

### 3.4.2 Temporary Construction Entrances

Temporary construction entrances provided a smooth transition from the Ford Road pavement and aided in reducing the mud tracked off the Site. The temporary construction entrances were located at the beginning of the North and South Access Roads. The temporary construction entrance installed for Phase I Remedial Action implementation served as the south temporary construction entrance for Phase II Remedial Action implementation. The north temporary construction entrance was constructed as part of the Phase II Remedial Action implementation. Haynes maintained the temporary construction entrances throughout the Phase II Remedial Action implementation.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the temporary construction entrances. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.4.2.1), construction/installation methods (Section 3.4.2.2), and CQA monitoring (Section 3.4.2.3) performed during installation of the temporary construction entrances. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC

requirements for materials and installation methods is provided in appendices as noted within each section of the temporary construction entrances discussion.

### 3.4.2.1 Materials and Equipment

The materials used to construct the north temporary construction entrance included the following:

- · 2-inch to 4-inch stone.
- 12-inch diameter steel culvert pipe.

The temporary construction entrance was constructed using the following equipment:

- John Deere 750J dozer.
- Kobelco 235 SRLC excavator.
- Cat 714 articulated end dump.
- · Various hand tools.

### 3.4.2.2 Construction/Installation Methods

The following activities were performed for the installation of the north temporary construction entrance:

- The stone and pipe were delivered to the Site.
- Haynes used straps to lift and place the pipe with the Kobelco 235 SRLC excavator.
- Haynes loaded the stone into the Cat 714 articulated end dump with the Kobelco 235 SRLC excavator.
- The Cat 714 articulated end dump hauled the stone to the temporary construction entrance and dumped the stone.
- The stone was pushed in place and graded using the John Deere 750J dozer.

Haynes kept a stockpile of the 2-inch to 4-inch stone onsite for use in maintaining the surface of the construction entrances throughout the Phase II Remedial Action implementation.

### 3.4.2.3 CQA Monitoring

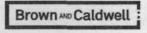
Brown and Caldwell's CQA monitor visually observed the installation of the temporary construction entrances for workmanship and continuity. The construction/installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the installation of the temporary construction entrance are provided in Appendix A with the installation photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during installation of the temporary construction entrance:

- Condition of the culvert pipe and proper stone size.
- Proper horizontal and vertical location of the culvert pipe.
- Proper length, width, and thickness of the construction entrance.
- Proper grading to promote surface water drainage.

The Brown and Caldwell's CQA monitor monitored the condition of the construction entrances and requested Haynes to periodically place and grade additional 2-inchto 4-inch stone for maintenance of the temporary construction entrances.

### 3.4.3 Site Clearing and Grubbing

Following installation of the erosion and sediment controls, H&H Land Clearing of Middlefield, Ohio performed site clearing and grubbing activities. Site clearing and grubbing included the removal of



ground cover, brush, trees, the grinding of stumps, and the chipping and off-site removal of the cleared materials. The materials were transported to Kurtz Brothers Recycling in Avon, Ohio for recycling.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the clearing and grubbing activities. The following sections of the Certification Report provide a summary of the written documentation for the equipment (Section 3.4.3.1), construction/installation methods (Section 3.4.3.2), and CQA monitoring (Section 3.4.3.3) performed for the clearing and grubbing activities. Photographic documentation is provided in Appendix B.

### 3.4.3.1 Equipment

Site clearing and grubbing was performed using the following equipment:

- Komatsu 228LC excavator with a grapple hook attachment.
- Morbark 3800 Wood Hog grinder.
- · John Deere 648E skidder.
- Komatsu 430FX excavator with a Quadco felling head attachment.
- · Various hand tools.

### 3.4.3.2 Construction/Installation Methods

The following activities were performed for clearing and grubbing:

- · Upper Surface Area:
  - o Removed designated trees and shrubs and other forms of vegetation.
    - Tree trunks, branches, and limbs were transported to and staged in the Upper Surface Area for chipping.
  - Sod, grass, weeds, and other forms of surface vegetation was removed as part of the topsoil stripping activity discussed in Section 3.9.2.3.
  - Stump grubbing was performed by grinding the stumps to within 2-3 inches of the adjacent ground surface.
  - Chipped tree trunks, branches, limbs, and underbrush.
  - o Removed chipped material from the Site.
- Steep Slope Area:
  - Removed designated trees and shrubs and other forms of vegetation.
    - Tree trunks, branches, and limbs were transported to and staged in the Upper Surface Area for chipping.
  - Surface vegetation, sod, grass, weeds, etc., were not removed.
  - Stump grubbing was performed by grinding the stumps to within 2-3 inches of the adjacent ground surface.
  - Chipped tree trunks, branches, limbs, and underbrush.
  - o Removed chipped material from the Site.

### 3.4.3.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the site clearing and grubbing activities for work-manship and continuity. The site clearing and grubbing activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs

providing a summary of the site clearing and grubbing activities are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the site clearing and grubbing activities:

- Removal of trees designated for removal.
- Chipping of tree trunks, branches, and limbs and off-site removal of the chipped material.
- Stump grinding to the appropriate height.

# 3.5 South Access Road

The South Access Road was partially constructed during the Phase I Remedial Action implementation. To complete the South Access Road, Haynes constructed the section of the South Access Road that runs along the top of the Sedimentation Basin berm. The South Access Road terminates at the northern end of the Sedimentation Basin in conjunction with the southern end of the Drivable Drainage Channel.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the South Access Road construction. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.5.1), construction/installation methods (Section 3.5.2), and CQA monitoring (Section 3.5.3) performed for the South Access Road construction.

# 3.5.1 Materials and Equipment

The materials used in the construction of the South Access Road included the following:

- 8 oz. non-woven geotextile.
- ODOT 304 aggregate subbase material.
- ODOT 411 stabilized crushed aggregate surface material.

The South Access Road was constructed using the following equipment:

- John Deere 750J dozer.
- Kobelco 235 SRLC excavator.
- · Cat 714 articulated end dump.
- Ingersoll Rand SD100D vibratory smooth drum roller.
- · Various hand tools.

### 3.5.2 Construction/Installation Methods

The following activities were performed for the construction of the South Access Road:

- 8 oz. non-woven geotextile, ODOT 304 aggregate, and ODOT 411 aggregate were delivered to the Site.
- Haynes placed 8 oz. non-woven geotextile on the top surface of the South Access Road constructed as part of the Sedimentation Basin berm (see Section 3.6 of the Certification Report).
   The geotextile was 15 feet wide placed with seams perpendicular to the centerline of the road.
   The seams were overlapped a minimum of six inches and were shingled such that the down gradient seam was placed under the up gradient seam.
- Subbase material:
  - Haynes loaded ODOT 304 aggregate into the Cat 714 articulated end dump with the Kobelco 235 SRLC excavator.
  - The Cat 714 articulated end dump hauled the aggregate to the South Access Road working area.



 The John Deere 750J dozer pushed the aggregate in place onto the geotextile and graded the aggregate to the required six-inch thickness.

### · Surface material:

- Haynes then loaded ODOT 411 aggregate into the Cat 714 articulated end dump with the Kobelco 235 SRLC excavator.
- The Cat 714 articulated end dump hauled the aggregate to the South Access Road working area.
- The John Deere 750J dozer pushed the aggregate in place onto the ODOT 304 aggregate subbase and graded the aggregate to the required six-inch thickness.
- The aggregate was rolled with the Ingersoll Rand SD100D vibratory smooth drum roller making a minimum of four passes.

# 3.5.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the South Access Road construction for workmanship and continuity. The South Access Road construction was documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the South Access Road construction are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the South Access Road construction:

- Proper placement, alignment, and overlap of the geotextile.
- Observed that equipment did not come in direct contact with the geotextile.
- Monitored the ODOT 304 aggregate placement for movement and/or wrinkles in the underlying geotextile.
- Proper width and thickness of the aggregates.
- Verified that the minimum number of four passes of the Ingersoll Rand SD100D vibratory smooth drum roller.

### 3.6 North Access Road

The North Access Road was constructed from the end of the north temporary construction entrance and terminated at the north end of the Drivable Drainage Channel.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the North Access Road construction. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.6.1), construction/installation methods (Section 3.6.2), and CQA monitoring (Section 3.6.3) performed for the North Access Road construction.

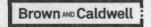
### 3.6.1 Materials and Equipment

The materials used in the construction of the North Access Road included the following:

- 8 oz. non-woven geotextile.
- ODOT 304 aggregate subbase material.
- ODOT 411 stabilized crushed aggregate surface material.

The North Access Road was constructed using the following equipment:

- John Deere 750J dozer.
- Kobelco 235 SRLC excavator.



- Cat 714 articulated end dump
- Ingersoll Rand SD100D vibratory smooth drum roller.
- · Various hand tools.

# 3.6.2 Construction/Installation Methods

The following activities were performed for the construction of the North Access Road:

- 8 oz. non-woven geotextile, ODOT 304 aggregate, and ODOT 411 aggregate were delivered to the Site.
- Haynes placed 8 oz. non-woven geotextile on the top surface of the North Access Road constructed as part of the Soil Buttress (see Section 3.7 of the Certification Report). The geotextile was 15 feet wide placed with seams perpendicular to the centerline of the road. The seams were overlapped a minimum of six inches and were shingled such that the down gradient seam was placed under the up gradient seam.
- Subbase material:
  - Haynes loaded ODOT 304 aggregate into the Cat 714 articulated end dump with the Kobelco 235 SRLC excavator.
  - The Cat 714 articulated end dump hauled the aggregate to the North Access Road working area.
  - The John Deere 750J dozer pushed the aggregate in place onto the geotextile and graded the aggregate to the required six-inch thickness.
- Surface material:
  - Haynes then loaded ODOT 411 aggregate into the Cat 714 articulated end dump with the Kobelco 235 SRLC excavator.
  - The Cat 714 articulated end dump hauled the aggregate to the North Access Road working area.
  - The John Deere 750J dozer pushed the aggregate in place onto the ODOT 304 aggregate subbase and graded the aggregate to the required six-inch thickness.
  - The aggregate was rolled with the Ingersoll Rand SD100D vibratory smooth drum roller making a minimum of four passes.

### 3.6.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the North Access Road construction for workmanship and continuity. The North Access Road construction was documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the North Access Road construction are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the North Access Road construction:

- Proper placement, alignment, and overlap of the geotextile.
- Observed that equipment did not come in direct contact with the geotextile.
- Monitored the ODOT 304 aggregate placement for movement and/or wrinkles in the underlying geotextile.
- Proper width and thickness of the aggregates.
- Verified that the minimum number of four passes of the Ingersoll Rand SD100D vibratory smooth drum roller.



# 3.7 Sedimentation Basin

The Sedimentation Basin construction included the construction of the berm including the emergency spillway and the installation of the principal spillway. Part of the Sedimentation Basin berm was constructed during the Phase I Remedial Action implementation. Soil material within the area of the Sedimentation Basin was bladed and graded to shape the berm to provide a temporary area for controlling surface water runoff from the areas disturbed during the Phase I Remedial Action implementation. The Sedimentation Basin construction was completed as part of the Phase II Remedial Action implementation.

Based on settlement of the berm that was constructed as part of the Phase I Remedial Action implementation, four test pits were excavated in the berm material down to the former existing ground surface. The results of the test pits determined the soil material to consist mostly of silts and clays (former floodplain soils, sediments, and debris) with pieces of wood i.e. tree branches, roots, etc. With exception for the southernmost 50 linear feet of berm, a decision was made to remove this material down to the former existing ground surface due to the apparent low strength of this material and the presence of pieces of wood and large rocks. The removed material was placed at the toe of the existing Steep Slope area, spread out along the slope, and covered by the construction of the Steep Slope Area Soil Buttress as discussed in Section 3.6.2 of the Report.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring for the Sedimentation Basin construction. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.6.1), construction/installation methods (Section 3.6.2), CQA monitoring (Section 3.6.3), and tests (Section 3.6.4) performed for the Sedimentation Basin construction.

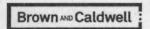
# 3.7.1 Materials and Equipment

The materials used in the construction of the Sedimentation Basin included the following:

- · Berm:
  - Soil material from the borrow source located behind the Metro Parks Maintenance Garage on Ford Road.
- · Emergency spillway:
  - Geosynthetic Turf Reinforcement Mat (TRM) Enkamat® 7020 with Flexible Growth Medium (FGM) Flexterra® HP-FGM™ infill.
- Principal spillway:
  - 24-inch diameter corrugated metal pipe (CMP) riser with seven rows of 3-inch diameter orifices.
  - o 30-inch diameter CMP anti-vortex device/track rack.
  - 12-inch diameter CMP outlet pipe with flared-end outlet structure.
  - o 8 oz. non-woven geotextile.
  - ODOT Type C riprap material.
  - o Concrete.

The Sedimentation Basin was constructed using the following equipment:

- John Deere 750J dozer.
- Kobelco 235 SRLC excavator.
- Cat 714 articulated end dump.



- Cat 815B sheepsfoot compactor.
- · Various hand tools.

### 3.7.2 Construction/Installation Methods

The following activities were performed for the construction of the Sedimentation Basin:

### Berm:

The partial berm constructed during the Phase I remedial Action implementation was removed down to the former existing ground surface due to the apparent low strength of this material and the presence of pieces of wood and large rocks. The following methods were used to remove the existing berm:

- The berm material was excavated with the Kobelco 235 SRLC excavator and placed in the Cat 714 articulated end dump.
- The Cat 714 articulated end dump transported the soil material to the toe of the Steep Slope Area.
- The soil material was spread up the slope with the John Deere 750J dozer where the soil material would be covered as the Soil Buttress was constructed.

The berm was constructed with off-site soil material possessing adequate strength and compaction characteristics as follows:

The off-site soil material was obtained from the Metro Parks soil stockpile.

The off-site soil material passed the laboratory QC testing requirements (see Section 3.1) and the Quality Assurance (QA) testing requirements as discussed in Section 3.6.4. The following construction methods were performed for the off-site soil placement:

- Haynes excavated the soil material and loaded the excavated soil in the 12-15-yd end dump highway trucks.
- o The trucks hauled the soil from the borrow areas to the Site.
- Haynes' site supervisor or the compactor operator directed the trucks where to dump each load.
- The soil was graded to a maximum eight-inch thick loose lifts with the John Deere 750J dozer.
  - The thickness of each lift was controlled by GPS.
  - The Brown and Caldwell CQA monitor(s) visually observed the graded soil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the soil.
- After each lift was graded, the lift was compacted using a Cat 815B sheepsfoot compactor making a minimum of five passes over the lift.
- o At the end of each workday, the surface of the top lift was sealed.
- The top lift surface was scarified before additional soil was placed at the beginning of each workday.
- Emergency spillway:
  - Haynes cut (excavated) the emergency spillway from the completed berm using the John Deere 750J dozer.



- o C J Zak Company, Inc. (Zak) from Richfield, Ohio installed the TRM and FGM/seed/fertilizer/water slurry infill.
  - A trench for placement of the outer edges and ends of the TRM was hand excavated.
  - The TRM sections were rolled out through the spillway sides and bottom and anchored in the outer edge trenches and on each end. Staples/anchor pins were inserted 8 inches from the panel edges and on 12 inch spacing across the width of the panels and at the panel end overlaps.
  - The TRM was infilled with the FGM/seed/fertilizer/water slurry using a truckmounted hydroseeder.

# Principal spillway:

- Haynes excavated the trench through the berm for installation of the outlet pipe using the Kobelco 235 SRLC excavator.
- o The outlet pipe was laid in the trench and backfilled and compacted up to the elevation of the top of the berm.
- The outlet pipe and flared outlet section were connected.
- Haynes excavated the riser pipe concrete base.
- o Haynes formed the concrete base.
- The riser was set in place and connected to the outlet pipe.
- o Haynes poured the concrete base around the riser.
- The 8 oz. non-woven geotextile was placed at the end of the flared outlet section to form the riprap outlet apron.
- o The ODOT Type C riprap material was placed to install the riprap apron.

### 3.7.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the Sedimentation Basin construction for workmanship and continuity. The Sedimentation Basin construction was documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the Sedimentation Basin construction are provided in Appendix A with the photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor for the Sedimentation Basin construction:

- · Berm Removal:
  - o Verified removal of the existing soil material down to the former existing ground surface.
  - o Placement of the soil material at the toe of the Steep Slope Area.
  - Verified the soil material was graded up the slope.
- Berm Construction:
  - The subbase of the berm was properly scarified for placement of the first soil lift.
  - The presence of large rocks, roots, debris, foreign materials, etc. in the soil material.
     These types of items, when observed, were removed from the soil material.
  - Visually observed the placement and uniformity of the lifts to a maximum uncompacted thickness of eight-inches.



- Verified the performance of adequate number of passes (minimum of five passes) with the sheepsfoot compactor.
- Verified that the last lift placed each day was sealed at the end of each workday to preserve the integrity of that lift and promote surface water runoff in the event of a storm.
- o Verified that the surface of the each lift was scarified prior to placement of the next lift.
- Performed In-place density testing using a nuclear density gauge to verify acceptance of compaction of each lift as discussed in Section 3.6.4 of the Certification Report.

# · Emergency spillway:

- o Verified the excavation was to the dimensions, lines, and grades.
- Proper anchor trench construction.
- o Proper TRM placement, overlap, and anchoring.
- o Proper staples/anchor pins spacing and installation.
- o Proper FGM/seed/fertilizer/water slurry infill of the TRM.

### Principal spillway:

- The riser and culvert pipe and anti-vortex device/trash rack were visually observed for conformance with the construction drawings, as well as to verify there were no signs of damage. The riser and culvert pipe and anti-vortex device/trash rack were determined to be in conformance with the construction drawings and no visual damage was observed.
- Proper assembly of the riser pipe and anti-vortex device/trash rack and outlet pipe flared outlet section.
- Riser pipe concrete base excavated to the proper lines and grades.
- Proper forming of concrete base.
- Adequate curing of the poured concrete rise pipe anchor base.
- o Trench excavation for the principal spillway to the required lines and grades.
- Proper placement of the outlet pipe and trench backfill and compaction up to the elevation of the top of the berm.
- Observe the ground surface for unacceptable protrusions (e.g., rocks, sticks, etc.) before geotextile placement was initiated.
- Proper geotextile placement.
  - o Adjacent geotextile panels were overlapped per manufacturer's recommendations.
  - Geotextile placement occurred in such a manner as to minimize wrinkling and to prevent crimping, scratching, and tearing of the geotextile.
- Observed the placement and uniformity of the ODOT Type C riprap material.

# 3.7.4 Quality Assurance (QA) Testing

Field QA testing was performed for the off-site soil materials used to construct the Sedimentation Basin berm. The minimum compaction specification for the off-site soil material was as follows:

• 95 percent of the maximum dry density with moisture content ±3% of optimum as determined by the Standard Proctor.

The Brown and Caldwell CQA monitor(s) performed the in-situ moisture/density testing using a nuclear density gauge for at least two tests per lift per acre in accordance with the CQAP prior to acceptance of the lift by the Brown and Caldwell CQA monitor(s). A total of 16 in-situ moisture/density tests were

performed during the construction of the Sedimentation Basin berm. The in-situ moisture/density test locations and results are provided in Appendix G.

# 3.8 Steep Slope Area Soil Buttress

Due to the frequency of storm events and the amount of rain that occurred throughout the performance of the Phase I Remedial Action implementation, the project schedule was extended from the original anticipated construction completion date of October 31, 2011 to December 17, 2011. The rain caused construction related issues such as shutdowns due to limited or no access to the work area(s), difficult and unsafe working conditions i.e. wet soil material caused equipment to slip/slide and creation of large ruts in areas being backfilled and soil placement areas causing continual re-working of soil material, and river flooding with river water flowing through the construction area.

Based on the weather (primarily the frequency and amount of rainfall) and the time of year (mid-December 2011), a decision was made to delay construction of the Steep Slope Area Soil Buttress (Soil Buttress) from the river plain of the Black River up to elevation 612 feet msl until the next construction season (Spring/Summer/Fall of 2012). The construction of the Soil Buttress was performed as part of the Phase II Remedial Action work.

The Steep Slope Area construction activities associated with the Phase II Remedial Action implementation included the construction of the Soil Buttress from the river plain of the Black River up to elevation 612 feet msl. Construction of this portion of the Soil Buttress would take the Soil Buttress above the 100-year flood elevation for the Black River; thus minimizing, if not eliminating, the affects of the river flooding resulting from storm events up river and at the Site. The Soil Buttress construction/installation included the following components:

- · Seep Drain Installation.
- Off-Site Soil and Topsoil Material.
- Riprap Extension.
- Surface Water Diversion Channels.
- Drivable Drainage Channel.
- Downchute channel.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring and tests performed for the Soil Buttress construction. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.7.1), construction/installation methods (Section 3.7.2), CQA monitoring (Section 3.7.3), and tests (Section 3.7.4) performed during construction of the Soil Buttress. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC and QA requirements for materials and construction methods are provided in appendices as noted within each section of the Soil Buttress discussion.

### 3.8.1 Materials and Equipment

The materials used in the construction of the Soil Buttress included the following:

- Seep drains:
  - 4-inch diameter SDR 17 high density polyethylene (HDPE) pipe with two, 3/8-inch diameter perforations located 120° apart on 6-inch spacing.
  - o No. 57 aggregate.
  - Polyvinyl chloride (PVC) check valves.



- o HDPE elbows, fittings, and appurtenances.
- Off-site soil obtained from the following approved sources:
  - o Metro Parks Service soil stockpile.
  - o Camp Wahoo.
  - o Grobe Fruit Farm.

Each of these off-site soil borrow sources was approved through quality control testing as discussed in Section 3.1 of the Certification Report.

- Off-site topsoil obtained from the following approved sources:
  - o Metro Parks Service soil stockpile.
  - o Camp Wahoo.
  - o Grobe Fruit Farm.

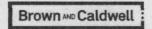
Each of these off-site topsoil borrow sources was approved through quality control testing as discussed in Section 3.1 of the Certification Report.

- Riprap extension:
  - ODOT Type A Riprap material.
- Surface water diversion channels:
  - Geosynthetic Turf Reinforcement Mat (TRM) Enkamat® 7020 with Flexible Growth Medium (FGM) Flexterra® HP-FGM™ infill.
- Drivable drainage channel:
  - o 4 oz. non-woven geotextile.
  - No. 57 aggregate.
  - o No. 8 aggregate.
  - o Netpave® 50 interlocking grids.
  - o Topsoil.
  - Flexible Growth Medium (FGM) Flexterra® HP-FGM™.
- · Downchute channel:
  - Geosynthetic Turf Reinforcement Mat (TRM) Enkamat® 7020 with Flexible Growth Medium (FGM) Flexterra® HP-FGM™ infill.
  - o 8 oz. non-woven geotextile.
  - o ODOT Type B riprap material.

Submittals for each of the materials previously listed are discussed in Section 3.1.of the Certification Report with copies of the submittals provided in Appendix E.

Equipment used for the Soil Buttress construction included the following:

- Seep drains:
  - o Kobelco 235 SRLC excavator.
  - o John Deere 304J endloader.
  - o McElroy No. 14 butt-fusion welder.
  - o Various hand tools.
- Soil and Topsoil Placement:



- o Cat D6R dozer.
- John Deere 750J dozers; one with a GPS attachment.
- o John Deere 762B scrapers.
- o John Deere 862 scraper.
- Case IH MX 255 tractor with box scraper.
- o Cat 815B sheepsfoot compactor.
- o Cat 714 articulated end dumps.
- o Kobelco 235 SRLC excavator.
- o Water truck.
- o Lay-Mor 8B sweeper.
- o Various hand tools.
- · Riprap extension:
  - o Kobelco 235 SRLC excavator.
  - o Cat 714 articulated end dump.
- · Surface water diversion channels:
  - o John Deere 750J dozer with a GPS attachment.
  - o Case RT60 Trencher.
  - o Various hand tools.
- Drivable drainage channel:
  - o John Deere 750J dozer with a GPS attachment.
  - Kobelco 235 SRLC excavator.
  - o Cat 714 articulated end dumps.
  - o John Deere 304J endloader.
  - o Various hand tools.
- Downchute channel:
  - o John Deere 750J dozer with a GPS attachment.
  - Kobelco 235 SRLC excavator.
  - o Case RT60 Trencher.
  - Various hand tools.

## 3.8.2 Construction/Installation Methods

Haynes performed the Soil Buttress construction. Brown and Caldwell's CQA monitor provided oversight and documentation of the Soil Buttress construction activities as presented in Section 3.10.3 of the Certification Report. The following sections of the Certification Report provide discussions of the construction/installation methods performed for each of the Soil Buttress components.

#### 3.8.2.1 Seep Drains Installation

During the Phase I Remedial Action implementation, several minor seeps were identified discharging from the toe of the landfill slope. While it is expected that construction of the Soil Buttress will eliminate the seeps, a horizontal drain system was discussed with, and proposed to, the U.S. EPA and the ACOE as

a precautionary measure for the build-up of water behind the Soil Buttress. The installation of the horizontal drain system (seep drains) was added to the Phase II Remedial Action implementation with the design drawings and specification included in the bid package.

The seep drains were installed along the toe of the Steep Slope Area for the purpose of intercepting the discharge from seeps that had appeared during the performance of the Phase I Remedial Action implementation. Seeps were identified in the proximity of the former North Soil Removal Area and one seep was identified approximately half way between the two Phase I onsite Lower Soil Placement Areas. The seep drains were installed to collect and direct any potential water from the north Steep Slope Area toe and the south Steep Slope Area toe toward the northern end of the Sedimentation Basin. Air traps were installed in each seep drain at intervals along the length of each drain. Construction/installation methods performed for the seep drains included the following:

- The HDPE pipe and ODOT 57 aggregate was delivered to the site and stored in a clean area.
- The 4-inch HDPE pipe was butt-fusion welded on-site by Haynes and set aside for later use.
- The excavator was used to excavate the trenches for the seep drains.
  - Excavated soil was placed on the Steep Slope Area toe side of the excavation; this
    excavated soil was covered during construction of the Soil Buttress.
- The ODOT. 57 aggregate was placed in the trench for pipe bedding approximately 3-inch in thickness following completion of the excavation.
- The HDPE pipe was placed in the trenches and backfilled with the No. 57 aggregate to the top of the trench level with the adjacent ground surface.
  - o Haynes used GPS equipment to check the grade of the pipe.

Haynes constructed 840 linear feet for the North Seep Drain with air traps installed 280 and 560 feet from the outlet end at the Sedimentation Basin and 400 linear feet for the South Seep Drain with an air trap installed 200 feet from the outlet end at the Sedimentation Basin. A PVC check valve was installed on the outlet pipe for each of the seep drains. The seep drain construction was completed on June 19, 2013 and as of December 4, 2013, no seeps had been observed.

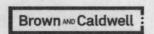
## 3.8.2.2 Placement of Off-Site Soils

The off-site soil material was obtained from the following sources:

- Metro Parks Service soil stockpile.
- · Grobe Fruit Farm.

The off-site soil material passed the laboratory QC testing requirements (see Section 3.1) and the Quality Assurance (QA) testing requirements as discussed in Section 3.10.4. The following construction methods were performed for the off-site soil placement:

- KS Associates, Inc. (KS Associates) of Elyria, Ohio performed construction stakeout of the Soil Buttress.
- Haynes excavated the soil material at the borrow area and loaded the excavated soil in the 12-15-yd end dump highway trucks.
- The trucks hauled the soil from the borrow areas to the Site.
- Haynes' site supervisor or the compactor operator directed the trucks where to dump each load.
  - Truck traffic entered the Site at the north construction entrance, traveled across the fill to the active fill area, and exited the Site at the south construction entrance.
- The soil was graded to a maximum 8-inch thick loose lift with the Cat 815B sheepsfoot compactor or the John Deere 750J dozer.



- o The thickness of each lift was controlled by GPS equipment.
- The Brown and Caldwell CQA monitor(s) visually observed the graded soil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the soil.
- After each lift was graded, the lift was compacted using a Cat 815B sheepsfoot compactor making a minimum of five passes over the lift.
- At the end of each workday, the surface of the top lift was sealed.
- The top lift surface was scarified before additional soil was placed at the beginning of each workday.

As the Soil Buttress construction neared the crest of the fill, Haynes made the following changes to the construction methods:

- Haynes' site supervisor or the dozer operator directed the trucks where to dump each load of soil on the Upper Surface Area.
- Self-loading scrapers picked up the soil and transported the soil to the active lift as directed by Haynes' site supervisor or the compactor operator.

This change in construction method was required due to the decreasing width of the working fill bench as the Soil Buttress progressed up the slope to the crest. The scrapers were able to work and maneuver more efficiently and safely on the smaller width working fill bench.

## 3.8.2.3 Placement of Off-Site Topsoil

The off-site topsoil material was obtained from the following sources:

- · Metro Parks Service soil stockpile.
- · Grobe Fruit Farm.

Laboratory QC testing demonstrated that off-site topsoil material met, or exceeded, the required specifications. (see Section 3.1). The following construction methods were performed for the off-site topsoil placement:

- Haynes segregated the topsoil material into stockpiles at each of the borrow sources then loaded the topsoil in the 12-15-yd end dump highway trucks.
- The trucks hauled the topsoil from the borrow areas to the Site.
- Haynes' site supervisor directed the trucks where to dump each load.
- The off-site topsoil was placed in stockpiles at the Upper Surface Area and loaded in the articulated end dumps or picked up by the scrapers for transport to the topsoil placement area.
- Topsoil placement Soil Buttress:
  - Topsoil was transported to the active placement area and dumped along the Steep Slope Area side of the North Access Road, Drivable Drainage Channel, Sedimentation Basin, and South Access Road.
  - o The dozer pushed the topsoil up the slope from the toe to the crest.
  - o The thickness of the topsoil was controlled by GPS equipment.
  - The Brown and Caldwell CQA monitor(s) visually observed the graded topsoil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the topsoil.
- Topsoil placement Below the Drivable Drainage Channel and Sedimentation Basin Outer Berm Slope:

- Topsoil was transported to the active placement area and dumped at the outer edge of the Drivable Drainage Channel and Sedimentation Basin berm.
- o The topsoil was placed with the excavator bucket from the crest to the toe of the slope.
- o The thickness of the topsoil was controlled by GPS equipment.
- The Brown and Caldwell CQA monitor(s) visually observed the graded topsoil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the topsoil.
- Before the topsoil was placed, the soil material was "cleated" with the dozer tracks by running
  the dozer perpendicular up the slope from the toe to the crest.

## 3.8.2.4 Riprap Extension

The riprap extension was riprap material placed above the riprap wall installed during the Phase I Remedial Action implementation to an elevation of 612.0 msl at the former North Soil Removal Area. The riprap extension provided a riprap face that extended above the 100-year flood elevation and provided protection of this area from potential erosion during the Black River flood events.

The riprap material for the installation of the riprap extension was obtained and delivered to the Site. The riprap material passed the laboratory QC testing requirements (see Section 3.1). The following construction methods were performed for riprap placement:

- End dump highway trucks delivered the ODOT Type A riprap at the Site.
- Haynes loaded the ODOT Type A riprap into the Cat 714 articulated end dump with the Kobelco 235 SRLC excavator.
- The Cat 714 end dump hauled the riprap to the Riprap Extension Area and stockpiled the riprap material for placement.
- The Kobelco 235 SRLC excavator was used to pick up and place individual pieces of riprap at the riprap extension area. Each piece of riprap was manipulated with the excavator bucket to "lock" the pieces of riprap together.

## 3.8.2.5 Surface Water Diversion Channels

The location, side slopes, and bottom grade of the surface water diversions channels were constructed as the Soil Buttress fill was placed. The channels were lined with the TRM infilled with FGM/seed/fertilizer/water slurry. The TRM and FGM materials passed the laboratory QC testing requirements (see Section 3.1). The following construction methods were performed for the surface water diversion channels:

- The Case RT60 Trencher was used to create a trench for placement of the outer edges and ends
  of the TRM.
- The TRM sections were rolled out through the channels and anchored in the outer edge trenches and on each end. Staples/anchor pins were inserted 8 inches from the panel edges and on 12 inch spacing across the width of the panels and at the panel end overlaps.
- The TRM was infilled with the FGM/seed using a truck-mounted hydroseeder.

A TRM/FGM representative, Tony Blatnik, CPESC, with JMD Company, was onsite for the initiation and periodically throughout the installation of the TRM/FGM system.

## 3.8.2.6 Drivable Drainage Channel

The Drivable Drainage Channel was constructed as part of the North Access Road to serve as a drainage channel to direct surface water runoff to the Sedimentation Basin and as a road to provide access to the groundwater monitoring wells installed along the toe of the outside edge of the Drivable Drainage



Channel. The Netpave® 50 interlocking grids were used in the bottom of the Drivable Drainage Channel to provide structure and strength for vehicles the size of pickup trucks the ability to drive on the channel without compromising the integrity of the channel. The materials used in the construction of the Drivable Drainage Channel passed the laboratory QC testing requirements (see Section 3.1). The following construction methods were performed for the Drivable Drainage Channel:

- The channel surface was rolled and observed for unacceptable protrusions (e.g., rocks, sticks, etc.) before geotextile placement was initiated.
- 4-oz. non-woven geotextile was placed on the surface of the channel.
  - o Adjacent geotextile panels were overlapped.
  - Geotextile placement occurred in such a manner as to minimize wrinkling and to prevent crimping, scratching, and tearing of the geotextile.
- The No. 57 aggregate base layer was placed in a minimum 12-inch lift thickness on top of the geotextile.
- The No. 8 aggregate bedding layer was placed in a minimum 4-inch lift thickness on top of the base layer.
- The Netpave® 50 interlocking grids were placed and locked on top of the bedding layer
- The grids were gently pushed into the bedding layer to an approximate depth of ¼ inch.
- 1/2-inch of topsoil was placed inside the grid spaces.
- The TRM was infilled with the FGM/seed/fertilizer/water slurry using a truck-mounted hydroseeder.

#### 3.8.2.7 Downchute Channel

The location, side slopes, and bottom grade of the downchute channel was constructed as the Soil Buttress fill was placed. The channel was lined with the TRM infilled with the FGM/seed/fertilizer/water slurry. The TRM and FGM materials passed the laboratory QC testing requirements (see Section 3.1). The following construction methods were performed for the downchute channel:

- The Case RT60 Trencher was used to create a trench for placement of the outer edges and ends
  of the TRM.
- The TRM sections were rolled out through the channel and anchored in the outer edge trenches
  and on each end. Staples/anchor pins were inserted 8 inches from the panel edges and on 12
  inch spacing across the width of the panels and at the panel end overlaps.
- The TRM was infilled with the FGM/seed/fertilizer/water slurry using a truck-mounted hydroseeder.
- The 8 oz. non-woven geotextile was placed at the end of the channel to form the riprap channel outlet structure.
- The ODOT Type B riprap material was placed to install the riprap channel outlet structure.

## 3.8.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the construction/installation of the Soil Buttress for workmanship and continuity. The construction/installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the Soil Buttress construction/installation are provided in Appendix A with the construction/installation photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during construction/installation of the Soil Buttress.

#### 3.8.3.1 Seep Drains

- The HDPE pipe was visually observed for conformance with the construction drawings, as well as
  to verify there were no signs of damage. The pipe was determined to be in conformance with the
  construction drawings and no visual damage to the pipe was observed.
- Butt-fusion welds were visually observed to be completed according to the butt-fusion welding specifications. The Brown and Caldwell CQA monitor observed hot plate temperature, holding times, and welding techniques. The welds were determined to be in conformance with the specifications.
- Proper horizontal location and depth of the trench.
- · Proper pipe bedding, alignment, grade, and backfill.

The Brown and Caldwell CQA monitor performed air monitoring during the construction/installation of the seep drains. A multi-gas QRAE+ monitoring device and a photoionization detector (PID) MiniRAE 2000, manufactured by RAE Systems, were used to conduct the air monitoring. The atmospheric concentrations within the breathing zone were monitored for methane (lower explosive limit [LEL]), oxygen, carbon monoxide, and hydrogen sulfide with the multi-gas QRAE+. The MiniRAE 2000 was used to screen for volatile organic compounds (VOCs). No issues were detected during the construction/installation of the seep drains and the air monitoring results are provided in Appendix J.

#### 3.8.3.2 Soil Placement

- · The quantity of material present in each load.
- The presence of large rocks, roots, debris, foreign materials, etc. in the soil material. These
  types of items, when observed, were removed from the soil material.
- Visually observed the placement and uniformity of the lifts to a maximum uncompacted thickness of eight inches.
- Performance of adequate number of passes (minimum of five passes) with the sheepsfoot compactor.
- Establishment of the grades to promote surface water flow from the graded area while eliminating potential surface water accumulation area(s).
- Sealing the surface of the top lift at the end of each workday and scarifying the top lift surface at the beginning of each workday before additional soil was placed.
- Condition of the soil material before the topsoil material was placed.
- Performed in-place density testing using a nuclear density gauge to verify acceptance of compaction of each lift as discussed in Section 3.7.4 of the Certification Report.

## 3.8.3.3 Topsoil Placement

- The quantity of material present in each load.
- The presence of large rocks, roots, debris, foreign materials, etc. in the topsoil material. These types of items, when observed, were removed from the topsoil material.
- Visually observed the placement and uniformity of the lifts to a thickness of three to four inches.
- Cleating of the soil material before the topsoil was placed.
- Establishment of the grades to promote surface water flow from the graded area while eliminating potential surface water accumulation area(s).

#### 3.8.3.4 Riprap Extension

• Visually observed the placement of the riprap material to the designated elevation (612.0 msl) and lateral extents.



- · Proper thickness of riprap face.
- Visually observed the completed riprap placement for open or "void" spaces in the riprap face.

#### 3.8.3.5 Surface Water Diversion Channels

- Visually observed the channel shape and grades.
- Proper anchor trench construction.
- · Proper TRM placement, overlap, and anchoring.
- Proper staples/anchor pins spacing and installation.
- Proper TRM infill with the FGM/seed/fertilizer/water slurry.

## 3.8.3.6 Drivable Drainage Channel

- Visually observed the channel shape and grades.
- Observe the channel surface for unacceptable protrusions (e.g., rocks, sticks, etc.) before geotextile placement was initiated.
- Proper geotextile placement and overlapping.
- Visually observed the placement and uniformity of the base layer to a minimum thickness of 12 inches.
- Visually observed the placement and uniformity of the bedding layer to a minimum thickness of 4 inches.
- Proper placement and locking of the Netpave® 50 interlocking grids on top of the bedding layer
- Proper bedding of the grids into the bedding layer.
- Visually observed the placement and uniformity of the topsoil to a minimum thickness of ½-inch inside the grid spaces.
- Proper TRM infill with the FGM/seed/fertilizer/water slurry.

#### 3.8.3.7 Downchute Channel

- Visually observed the channel shape and grade.
- Proper anchor trench construction.
- Proper TRM placement, overlap, and anchoring.
- Proper staples/anchor pins spacing and installation.
- Proper TRM infill with the FGM/seed/fertilizer/water slurry.
- Observe the ground surface for unacceptable protrusions (e.g., rocks, sticks, etc.) before geotextile placement was initiated.
- Proper geotextile placement.
  - Adjacent geotextile panels were overlapped.
  - Geotextile placement occurred in such a manner as to minimize wrinkling and to prevent crimping, scratching, and tearing of the geotextile.
- Observed the placement and uniformity of the ODOT Type B riprap material.

Throughout the performance of the Soil Buttress construction, the Brown and Caldwell CQA monitor(s) observed Ford Road for the "tracking" of soil material from the Site. Haynes was directed to sweep and/or washdown Ford Road when site conditions at the Site dictated.

## 3.8.4 Quality Assurance (QA) Testing

Field QA testing was performed for the off-site soil materials used to construct the Soil Buttress. The minimum compaction specification for the off-site soil material was as follows:

95 percent of the maximum dry density with moisture content -3% to +2% of optimum as determined by the Modified Proctor.

The Brown and Caldwell CQA monitor(s) performed the in-situ moisture/density testing using a nuclear density gauge for at least two tests per lift per acre in accordance with the CQAP prior to acceptance of the lift by the Brown and Caldwell CQA monitor(s). A total of 275 in-situ moisture/density tests were performed during the construction of the Soil Buttress. The in-situ moisture/density test results are provided in Appendix G.

# 3.9 Upper Surface Area Final Cover System Cap

The Upper Surface Area required the construction of a final cover system cap to be compliant with the 1976 Ohio EPA final cover system regulations. Specifically, the thickness of the cap was required to be two feet thick (24-inches) constructed with soil material possessing a permeability (k) of  $\leq 1 \times 10^{-5}$  centimeters per second (cm/sec). The Upper Surface Area final cover system cap (cap) implementation included the performance of the following activities:

- · Grading soil from the Phase I Onsite Soil Placement Area.
- · Incorporation of the investigation-derived waste (IDW) soil drums.
- · Construction of the cap including the following:
  - o Topsoil stripping/stockpiling.
  - o Subgrade construction.
  - o Cap construction.
  - o Topsoil placement/replacement.

Brown and Caldwell's CQA Monitor(s) performed field oversight to document the materials, equipment, construction/installation methods, and CQA monitoring and tests performed for the cap construction. The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.8.1), construction/installation methods (Section 3.8.2), CQA monitoring (Section 3.8.3), and tests (Section 3.8.4) performed during construction of the cap. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC and QA requirements for materials and construction methods is provided in appendices as noted within each section of the cap construction discussion.

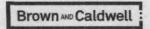
## 3.9.1 Materials and Equipment

The materials used in the construction of the cap included the following:

- Off-site soil obtained from the following approved sources:
  - o Camp Wahoo.
  - o Grobe Fruit Farm.

The off-site soil borrow source was approved through quality control testing as discussed in Section 3.1 of the Certification Report.

- Onsite topsoil stripped and placed in a stockpile.
- Off-site topsoil obtained from the following approved sources:
  - o Metro Parks Service.



o Grobe Fruit Farm.

Each of these off-site topsoil borrow sources were approved through quality control testing as discussed in Section 3.1 of the Certification Report.

Equipment used for the cap construction included the following:

- Phase I Onsite Soil Placement Area:
  - o John Deere 750J dozer.
- IDW soil drums:
  - o John Deere 304J endloader.
  - o John Deere 750J dozer.
  - Kobelco 235 SRLC excavator.
- Cap construction:
  - o John Deere 750J dozers; one with a GPS attachment.
  - o John Deere 762B scrapers.
  - o John Deere 862 scraper.
  - o Case IH MX 255 tractor with box scraper.
  - o Cat 815B sheepsfoot compactor.
  - o Cat 714 articulated end dumps.
  - o Kobelco 235 SRLC excavator.
  - Water truck.
  - o Lay-Mor 8B sweeper.
  - o Various hand tools.

## 3.9.2 Construction/Installation Methods

Haynes performed the cap construction. Brown and Caldwell's CQA monitor(s) provided oversight and documentation of the cap construction activities as presented in Section 3.9.3 of the Certification Report. The following sections of the Certification Report provide discussions of the construction/installation methods performed for each of the cap construction activities.

## 3.9.2.1 Phase I Onsite Soil Placement Area

The soil in the Onsite Soil Placement Area from the Phase I Remedial Action work was graded evenly to areas adjacent to the Onsite Soil Placement Area that was covered with a minimum of 24 inches of lower permeability soil.

#### 3.9.2.2 IDW Soil Drums

The IDW soil drums were removed from the onsite Conex box and were transported to the placement area using the endloader. The soil in the drums was emptied and the soil was evenly spread. The drums were smashed with the excavator bucket and run over with the dozer to make the drums as flat as possible. The placement area was picked so that a minimum of 24 inches of lower permeability soil was placed above the soil and drums. The location where the soil and drums were placed in shown on Project Record Drawing RD-10

#### 3.9.2.3 Topsoil Stripping

The existing topsoil present on the Upper Surface Area was removed and placed in a stockpile for replacement when the cap construction was completed. The vegetation was removed with the topsoil. Haynes used a dozer to blade approximately 4 to 6 inches of topsoil across the northern two-thirds of the Upper Surface Area and pushed the topsoil into a stockpile. Topsoil from the southern part of the Upper Surface Area was removed with the self-loading scrapers and placed in the stockpile. The stockpile was located in the northwestern part of the Upper Surface Area 15 to 20 feet west of the crest of the Steep Slope Area.

## 3.9.2.4 Subgrade Construction

The subgrade construction consisted of regrading/redistributing the existing soil in the Upper Surface Area to provide a stable base on which to place the lower permeability soil for the cap construction. Haynes used the dozer equipped with the GPS attachment to regrade/redistribute the existing soil at the required elevations and grades.

In the course of regrading the onsite soil, waste material was intermittently encountered in one location before the required subgrade elevation was established. The location of this area is shown on Project Record Drawing RD-03. In consultation with William T. Frederick of the U.S. Army Corps of Engineers (ACOE), who was present at the Site when the northern end this area was encountered, the following methods were used to handle the exposed waste:

- The limits of the exposed waste were delineated with agreement of the Brown and Caldwell CQA monitor and Mr. Frederick of the ACOE.
  - The waste material consisted of plastic, pieces of wood, broken ceramic pieces, etc. No municipal-type waste material was identified in waste material excavated and placed beneath the Steep Slope Area soil buttress.
- Haynes excavated the waste material to an average depth of 18 to 24 inches below the existing ground surface.
  - o This depth was determined based on the final grade of the cap required in this area in order to provide a minimum of 24 inches of lower permeability soil above the waste.
- The waste was placed in the articulated end dump and hauled to the Steep Slope Area and placed against at the toe of the fill bench and was pushed up the slope.
  - 1,565 cubic yards of waste was placed and pushed up the slope.
- The placed waste material was covered with the Steep Slope Area soil buttress material.
- The excavation was filled with the lower permeability soil material to the surface adjacent to the excavation.

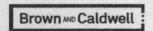
#### 3.9.2.5 Cap Construction

The off-site soil material was obtained from the following sources:

- Metro Parks Service soil stockpile.
- · Camp Wahoo.
- Grobe Fruit Farm.

The off-site soil material met the required specifications as confirmed by laboratory QC testing (see Section 3.1) and the Quality Assurance (QA) testing requirements as discussed in Section 3.11.4. The following methods were performed for the cap construction:

KS Associates performed construction stakeout for the cap construction.



- Haynes excavated the soil material and loaded the excavated soil in the 12-15-yd end dump highway trucks.
- The trucks hauled the soil from the borrow areas to the Site.
- Haynes' site supervisor or the compactor operator directed the trucks where to dump each load.
  - Truck traffic entered the Site at one construction entrance and exited the Site at the other construction entrance.
- The soil was graded to a maximum 8-inch thick loose lift with the Cat 815B sheepsfoot compactor or the John Deere 750J dozer.
  - The thickness of each lift and the grade of the cap was controlled by the GPS attachment on the dozer blade.
  - The Brown and Caldwell CQA monitor(s) visually observed the graded soil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the soil.
- After each lift was graded, the lift was compacted using a Cat 815B sheepsfoot compactor making a minimum of five passes over the lift.
- At the end of each workday, the surface of the top lift was sealed.
- The top lift surface was scarified before additional soil was placed at the beginning of each workday.

A request was made by the Metro Parks Service to leave some of the trees along Ford Road. The remaining trees would provide a visual barrier between the Upper Surface Area of the Site and residents driving along Ford Road. A figure was produced showing which trees could be left in place along Ford Road based on a site walkthrough attended by representatives of Brown and Caldwell and the Ohio EPA. The figure was provided to the U.S. EPA and Ohio EPA for review. A consensus was reached with the Project Team Members for which trees would remain with the Ohio EPA providing approval in an e-mail to the U.S. EPA. The trees designated for removal were marked in the field. The limits of the constructed cap along Ford Road stopped short of the remaining tree line with the cap tying into existing ground to promote surface water runoff to the ditch running along Ford Road.

## 3.9.2.6 Onsite Topsoil Replacement

The following construction methods were performed for the onsite topsoil replacement:

- Self-loading scrapers were used to load topsoil from the onsite stockpile.
- The topsoil was placed at various locations across the Upper Surface Area.
- The topsoil was graded to an even thickness on top of the cap across the Upper Surface Area.
  - o The thickness of the topsoil was controlled by GPS equipment.
  - The Brown and Caldwell CQA monitor(s) visually observed the graded topsoil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the topsoil.

## 3.9.2.7 Off-Site Topsoil Placement

The off-site topsoil material was obtained from the following sources:

- Metro Parks Service.
- · Grobe Fruit Farm.

The off-site topsoil material met the required specifications based on laboratory QC testing (see Section 3.1). The following construction methods were performed for the off-site topsoil placement:



- Haynes segregated the topsoil material into stockpiles at each of the borrow sources then loaded the topsoil in the 12-15-yd end dump highway trucks.
- The trucks hauled the topsoil from the borrow areas to the Site.
- Haynes' site supervisor directed the trucks where to place the topsoil in stockpiles at the Upper Surface Area.
- Topsoil placement:
  - o Self-loading scrapers were used to load topsoil from the onsite stockpile.
  - o The topsoil was placed at various locations across the Upper Surface Area.
  - The topsoil was graded to an even thickness on top of the cap across the Upper Surface Area with the 750J dozer equipped with a GSP unit.
    - The thickness of the topsoil was controlled by GPS equipment.
    - The dozer operators and the Brown and Caldwell CQA monitor(s) visually observed the graded topsoil for the presence of organic material, large rocks, roots, and other debris/foreign material. This material was removed from the topsoil.

## 3.9.3 CQA Monitoring

Brown and Caldwell's CQA monitor(s) visually observed the construction of the cap for workmanship and continuity. The construction/installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the cap construction are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during construction of the cap.

#### 3.9.3.1 Phase I Onsite Soil Placement Area Placement

 The soil was placed in a location of the Upper Surface Area that was adequately covered by the cap.

## 3.9.3.2 IDW Soil Drums

- The soil and drums placed in a location of the Upper Surface Area that was adequately covered by the cap.
- The drums were crushed and placed in a manner to not create obstructions/protrusions into the subgrade and/or cap.

#### 3.9.3.3 Topsoil Stripping

- · Topsoil removed from the designated areas.
- Proper depth of topsoil including vegetation removal.
- Placement of removed topsoil in the stockpile.

#### 3.9.3.4 Subgrade Construction

- The presence of large rocks, roots, debris, foreign materials, waste, etc. in the subgrade soil material.
   These types of items, when observed, were removed from the soil material.
- Subgrade:
  - Visually observed the placement and uniformity of the lifts to a maximum uncompacted thickness of eight inches.
  - Performance of adequate number of passes (minimum of five passes) with the sheepsfoot compactor.



- Sealing the surface of the top lift at the end of each workday and scarifying the top lift surface at the beginning of each workday before additional soil was placed.
- Establishment of the grades to promote surface water flow from the graded area while eliminating potential surface water accumulation area(s).
- Condition of the subgrade before the lower permemability soil material was placed.
- For the waste removal area:
  - o The excavation performed to the limits as delineated.
  - o The excavation limited to no deeper than an average depth of 18-24 inches below the existing ground surface.
  - The waste placed in a location and pushed up the slope at the Steep Slope Area that was adequately covered by the Steep Slope Area soil buttress material.
  - The excavation was filled with the lower permeability soil material to the surface adjacent to the excavation.

#### 3.9.3.5 Cap Construction

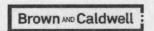
- The quantity of material present in each load.
- The presence of large rocks, roots, debris, foreign materials, etc. in the lower permeability soil material. These types of items, when observed, were removed from the soil material.
- Visually observed the placement and uniformity of the lifts to a maximum uncompacted thickness of eight inches.
- Performance of adequate number of passes (minimum of five passes) with the sheepsfoot compactor.
- Establishment of the grades to promote surface water flow from the graded area while eliminating potential surface water accumulation area(s).
- Sealing the surface of the top lift at the end of each workday and scarifying the top lift surface at the beginning of each workday before additional soil was placed.
- Condition of the soil material before the topsoil material was placed.
- Performed In-place density testing using a nuclear density gauge to verify acceptance of compaction of each lift as discussed in Section 3.8.4 of the Certification Report.
- KS Associates provided field survey information from an established 50-foot grid pattern across the Upper Surface Area. This information was used to verify that a minimum of two feet of low permeability soil material was placed above the top of existing waste. Brown and Caldwell compared the field survey information for the top of the low permeability soil material to the top of existing waste to verify the minimum thickness of two feet (see Project Record Drawing RD-04).

## 3.9.3.6 Onsite Topsoil Replacement

- The presence of large rocks, roots, debris, foreign materials, etc. in the topsoil material. These types of items, when observed, were removed from the topsoil material.
- Visually observed the placement and uniformity of the lifts to a thickness of three to four inches.
- Establishment of the grades to promote surface water flow from the graded area while eliminating potential surface water accumulation area(s).

## 3.9.3.7 Off-Site Topsoil Placement

The quantity of material present in each load.



- The presence of large rocks, roots, debris, foreign materials, etc. in the topsoil material. These types of items, when observed, were removed from the topsoil material.
- Visually observed the placement and uniformity of the lifts to a thickness of three to four inches.
- Establishment of the grades to promote surface water flow from the graded area while eliminating potential surface water accumulation area(s).

## 3.9.4 Quality Assurance (QA) Testing

Field QA testing was performed for the off-site soil materials used to construct the cap. The minimum compaction specification for the off-site soil material was as follows:

95 percent of the maximum dry density with moisture content -2% to +3% of optimum as determined by the Modified Proctor.

The Brown and Caldwell CQA monitor(s) performed the in-situ moisture/density testing using a nuclear density gauge for at least two tests per lift per acre in accordance with the CQAP prior to acceptance of the lift by the Brown and Caldwell CQA monitor(s). A total of 31 in-situ moisture/density tests were performed during the construction of the cap. The in-situ moisture/density test results are provided in Appendix G.

## 3.10 Ford Road Culvert Outlet Channel

The Ford Road Culvert Outlet Channel (Outlet Channel) work involved adjusting the location of the Outlet Channel to the north away from the North Access Road construction. This adjustment occurred from the existing concrete headwall for 60 feet to the east. The remainder of the Outlet Channel was constructed down the slope to the east toward the Black River floodplain. The eastern end of the Outlet Channel terminated where the Outlet Channel intersected with the existing riprap material associated with the City of Elyria siphon to the wastewater treatment plant (WWTP) across the river. The upper reach of the Outlet Channel was constructed with Type D ODOT aggregate and the rest of the Outlet Channel was constructed with the geosynthetic Turf Reinforcement Mat (TRM) Enkamat® 7020 with Flexible Growth Medium (FGM) Flexterra® HP-FGM™ infill.

During construction of the Outlet Channel, a seep appeared in the sideslope on the northern side toward the upper end of the excavated Outlet Channel sideslope. Initially there was a heavy odor associated with the seep that dissipated over a few days. Based on the location of the seep outbreak (north of the landfill and in proximity to the City of Elyria (City) siphon to the WWTP, Brown and Caldwell contacted the City of Elyria and asked City representatives to come to the Site to look at the seep. The City collected samples of the seep and based on the analytical results and visual observations, the seep appeared to be water discharging from south of the Channel excavation. Since ammonia was not detected in the sample and trace metals are within the levels expected for natural groundwater, the seep did not appear to be leachate or wastewater. Following review of the analytical data by William Frederick of the ACOE, a decision was made to monitor the seep and address any further issues as part of the long-term operations and maintenance (O&M) for the Site. Analytical results and a figure depicting the location of the seep are provided in Appendix H.

The following sections of the Certification Report provide a summary of the written documentation for the materials and equipment (Section 3.9.1), construction/installation methods (Section 3.9.2), and CQA monitoring (Section 3.9.3) performed during construction of the Outlet Channel. Photographic documentation is provided in Appendix B. Information, data, and test results for the QC requirements for materials and construction methods is provided in appendices as noted within each section of the Outlet Channel discussion.

## 3.10.1 Materials and Equipment

The materials used in the construction of the Outlet Channel included the following:

- ODOT Type D aggregate.
- 8-oz. non-woven geotextile.
- TRM with FGM/seed/fertilizer/water slurry infill.

Equipment used for the Outlet Channel construction included the following:

- John Deere 750J dozer with a GPS attachment.
- Kobelco 235 SRLC excavator.
- Cat 714 articulated end dumps.
- John Deere 304J endloader.
- · Various hand tools.

## 3.10.2 Construction/Installation Methods

The location, side slopes, and bottom grade of the Outlet Channel was constructed in virgin soil with some fill placed at the existing concrete headwall. The Outlet Channel was lined with TRM with FGM infill and aggregate. The aggregate and TRM and FGM materials passed the laboratory QC testing requirements (see Section 3.1). The following construction methods were performed for the Outlet Channel:

- Upper Channel Reach:
  - The channel surface was observed for unacceptable protrusions (e.g., rocks, sticks, etc.) before geotextile placement was initiated.
  - o 8-oz. non-woven geotextile was placed on the surface of the channel.
    - Adjacent geotextile panels were overlapped.
    - Geotextile placement occurred in such a manner as to minimize wrinkling and to prevent crimping, scratching, and tearing of the geotextile.
  - The ODOT Type D riprap was placed on top of the geotextile.
- · Lower Channel Reach:
  - The Case RT60 Trencher was used to create a trench for placement of the outer edges and ends of the TRM.
  - o The TRM sections were rolled out through the channels and anchored in the outer edge trenches and on each end. Staples/anchor pins were inserted 8 inches from the panel edges and on 12 inch spacing across the width of the panels and at the panel end overlaps.
  - The TRM was infilled with the FGM/seed/fertilizer/water slurry using a truck-mounted hydroseeder.

## 3.10.3 CQA Monitoring

Brown and Caldwell's CQA monitor visually observed the construction/installation of the Outlet Channel for workmanship and continuity. The construction/installation activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the Outlet Channel construction/installation are provided in Appendix A with the construction/installation photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during construction/installation of the Outlet Channel:

- Observed the channel shape and grades.
- Observe the channel surface for unacceptable protrusions (e.g., rocks, sticks, etc.) before geotextile placement was initiated.
- Proper geotextile placement.
  - o Adjacent geotextile panels were overlapped per manufacturer's recommendations.
  - o Geotextile placement occurred in such a manner as to minimize wrinkling and to prevent crimping, scratching, and tearing of the geotextile.
- Observed the placement and uniformity of the ODOT Type D aggregate.
- · Proper TRM anchor trench construction.
- Proper TRM placement, overlap, and anchoring.
- Proper staples/anchor pins spacing and installation.
- Proper TRM infill with the FGM/seed/fertilizer/water slurry.

## 3.11 Site Restoration and Closure

Site Restoration and Closure activities were performed from September 24, 2012 through January 15, 2013 including the following:

- Installation of seven new groundwater monitoring wells.
  - The new groundwater monitoring wells (wells) replaced the seven wells abandoned in 2011 as part of the Phase I Remedial Action implementation. The location of the new wells was proposed to the U.S. EPA on September 7, 2012 and approved by the U.S. EPA on September 9, 2012. Several modifications to the approved Field Sampling Plan (FSP) procedures, specific to this work requested by the ACOE, were submitted to the U.S. EPA on September 10, 2012 and approved by the U.S. EPA on September 11, 2012. The modifications included not collecting continuous soil samples of recently constructed Steep Slope Area Soil Buttress (Soil Buttress) fill; the 10-foot screened interval for each well extends from approximately six to 12 inches in the bedrock upward into overburden to best capture the saturated thickness; and disposal of un-impacted soil cuttings, decontamination water, and well development water in the onsite Sedimentation Basin. The Monitoring Well Installations and Development letter submitted to the U.S. EPA is provided in Appendix K.
- Installation of the geosynthetic Turf Reinforcement Mat (TRM) Enkamat® 7020 on the Steep Slope Area soil buttress (soil buttress) from the toe of soil buttress fill up to elevation 612.0 msl and on the exterior slope and the emergency spillway of the Sedimentation Basin berm (berm).
- Vegetation of the Upper Surface Area with the permanent seed mix including adjacent areas disturbed through the normal course of performing the work activities.
- Vegetation of the Steep Slope Area with the steep slope seed mix including adjacent areas disturbed through the normal course of performing the work activities.
  - o Flexible Growth Medium (FGM) Flexterra® HP-FGM™ to infill the TRM.
  - Straw wattles installed parallel across the Steep Slope Area.
- Haynes demobilization from the Site.
- Willow stake planting from the southern end of the riprap at the former North Soil Removal Area to the south for approximately 280 feet within the Black River floodplain.
- Repair work for designated areas of Ford Road.
- Installation of the fence sections and gates at the North and South Access Road entrances.



The materials and equipment used (Section 3.11.1), construction/installation methods (Section 3.11.2), and CQA observations (Section 3.11.3) for each of the Site Restoration and Closure activities are discussed in the following sections.

## 3.11.1 Materials and Equipment

The materials used in the performance of the Site Restoration and Closure activities included the following:

- Groundwater Monitoring Wells:
  - o 2-inch inside diameter (ID) Schedule 40 PVC with 10 feet of 0.010 slot well screen.
  - Silica sand, bentonite chips, and ready-mix concrete.
  - Lockable protective casings.
- TRM Installation:
  - o Enkamat® 7020.

Each of these materials was approved through quality control review as discussed in Section 3.1 of the Certification Report.

- · Upper Surface Area Vegetation:
  - o Flat Area seed mix.
  - o Rye grass seed.
  - o Fertilizer: 15-30-15.

Each of these materials was approved through quality control review as discussed in Section 3.1 of the Certification Report with seed tags provided in Appendix L.

- Steep Slope Area Vegetation:
  - o Slope Mix seed.
  - o Rye grass seed.
  - o Fertilizer: 15-30-15.
  - o Flexterra® HP-FGM™.
  - o AEC Premier straw wattle.

Each of these materials was approved through quality control review as discussed in Section 3.1 of the Certification Report with seed tags provided in Appendix L.

- Willow Stake Planting:
  - o 85 streamco willows.
  - o 80 pussy willows.
  - o 80 black willows.
- · Fence and Gates Installation:
  - Three-rail tube fence sections and two 12-foot wide double drive bar gates with appurtenances.

Each of these materials was approved through quality control review as discussed in Section 3.1 of the Certification Report.

The equipment used in the performance of the Site Restoration and Closure activities included the following:



- · Groundwater Monitoring Wells:
  - o ATV drill rig.
  - o Split-spoon samplers.
  - o Support truck.
  - o High pressure water cleaner.
  - o Various hand tools.
- TRM Installation:
  - o Case RT60 trencher.
  - o John Deere 304J endloader.
  - Various hand tools.
- Upper Surface Area Vegetation:
  - o Cat D5 Dozer.
  - o John Deere 304J endloader.
  - o Truck-mounted hydroseeder.
  - o Various hand tools.
- · Steep Slope Area Vegetation:
  - o Cat D5 Dozer.
  - o John Deere 304J endloader.
  - o Truck-mounted hydroseeder.
  - o Various hand tools.
- Willow Stake Planting:
  - o Hand-held spades.
- · Fence and Gates Installation:
  - o Hand-held power auger.
  - o Various hand tools.

## 3.11.2 Construction/Installation Methods

Haynes performed the demobilization activities and subcontracted the following entities for performance of the Site Restoration and Closure activities:

- · Zak for vegetation and TRM/FGM installation.
- Precision Paving Inc. from Elyria, Ohio for Ford Road repairs.
- Inline Fence Inc. from Shelby, Ohio for the fence and gates installation.

Brown and Caldwell's CQA monitor(s) and Geologist provided oversight and documentation of the Site Restoration and Closure activities as presented in Section 3.11.3 of the Certification Report. The following sections of the Certification Report provide discussions of the construction/installation methods performed for each of the Site Restoration and Closure activities.

#### 3.11.2.1 Groundwater Monitoring Well Installation/Development

The following methods were used for the groundwater monitoring well (well) installations:

The ATV drill rig was positioned over the location for the new wells.



- Bore holes were drilled using 4-1/4-inch diameter hollow stem augers (HSA).
  - Soil samples were not collected while drilling through the recently constructed Steep Slope Area Soil Buttress (Soil Buttress) fill (approved by the U.S. EPA on September 11, 2013).
  - Continuous sampling using split-spoon samplers was performed from the depth where the original ground surface was encountered (bottom of the Soil Buttress fill) to the termination depth of each well.
  - Each well was "seated" approximately six to twelve inches into the underlying shale bedrock and screened 10 feet into the overburden as requested by the ACOE (approved by the U.S. EPA on September 11, 2013).
  - o The soil cuttings were screened with a photionization detector (PID) to check for impacts before spreading the cuttings on the ground surface in the vicinity of the boring.
  - Drilling equipment in contact with the subsurface material was decontaminated between well locations using pressurized water/steam. The wash water was discharged to the Sedimentation Basin.
- The well casing and well screen were placed through the middle of the HSA.
- The augers were raised incrementally allowing placement of the silica sand pack in the bore hole annulus from the bottom of the well screen to a height two feet above the well screen.
- A bentonite seal using bentonite chips followed by a bentonite slurry was tremie grouted to within three feet of the ground surface adjacent to the well.
- The final three feet was filled with ready-mix concrete.
- A four-inch square by five-foot long protective steel casing with lockable cap was placed over the well casing stick-up and set inside a two-foot by two-foot by four-inch thick concrete pad.
- The new wells were surveyed for location and elevation control by Bair, Goode & Associates, Inc. of New Philadelphia, Ohio.

The following methods were used for the well development of the seven new wells:

- TTL used surge blocks and submersible pumps on October 2, 2012 to develop the wells.
- Field parameters were measured throughout the development period.
- The development water was discharged to the Sedimentation Basin.

The following methods were used for the well development of the seven new wells and three existing wells by Brown and Caldwell from October 24 to October 26, 2012:

- Water levels for the ten wells were measured and recorded.
- Bailers were used to remove the groundwater, accumulated fines, and to surge the screened interval.
- Field parameters were measured and recorded throughout the development period.
- The development water was discharged to the Sedimentation Basin.

## 3.11.2.2 TRM Installation

The following construction methods were performed for the TRM installation:

- The Case RT60 Trencher was used to create a trench for placement of the outer edges and ends
  of the TRM.
- The TRM sections were rolled out down the slope from the crest to the toe and anchored in the outer edge trenches and on each end. Staples/anchor pins were inserted 8 inches from the

panel edges and on 12 inch spacing across the width of the panels and at the panel end overlaps.

 The TRM was infilled with the FGM/seed/fertilizer/water slurry using a truck-mounted hydroseeder.

## 3.11.2.3 Upper Surface Area Vegetation

The following construction methods were performed for the Upper Surface Area Vegetation:

- · Finish grading of the areas to be vegetated was performed.
- The seed and fertilizer were loaded with water into the hydroseeder.
- The seed/fertilizer/water slurry was sprayed onto the areas to be vegetated.

## 3.11.2.4 Steep Slope Area Vegetation

The following construction methods were performed for the Steep Slope Area Vegetation:

- Before the FGM was placed, the topsoil material was "cleated" with the dozer tracks by walking the dozer perpendicular up the slope from the toe to the crest.
- The seed, fertilizer, and FGM were loaded with water into the hydroseeder.
- The FGM/seed/fertilizer/water slurry was sprayed onto the areas to be vegetated.
- The straw wattle was installed as follows:
  - o A trench was excavated along the length of each individual wattle.
  - o The wattle was placed in the trench.
  - The wood stakes were pounded through the wattle on 4-foot centers across the length of the wattle.
  - o The ends of the wattles were overlapped a minimum of 12 inches on each end.

#### 3.11.2.5 Demobilization

The following demobilization activities were performed:

- Brown and Caldwell made arrangement for removal of the Conex box from the Site; the Conex box was taken off the site on October 18, 2012.
- Haynes demobilized equipment from October 18, 2012 through October 23, 2012.
- Ohio Edison disconnected and removed the power line from the Ford Road pole to the pole at the office trailer on October 19, 2012.
- Office trailer was removed on October 22, 2012.
- Callahan removed the power pole at the office trailer on October 23, 2012.
- A final site walkthrough was performed on October 23, 2012 by the Brown and Caldwell CQA
  monitor and Haynes to check the integrity of the silt fence and straw bales along the Black River
  floodplain and the overall cleanliness of the Site.

### 3.11.2.6 Willow Stake Planting

The following construction/installation activities were performed for the willow stake planting:

- Brown and Caldwell ordered the willow stakes.
- The Brown and Caldwell CQA monitors, under the guidance of William Frederick of the ACOE, planted the willow stakes on October 13, 2012.
- The willow stakes were planted in a 5-foot triangular spacing that provided three rows along the approximate 280-foot horizontal floodplain.



- o 245 willow stakes were planted.
- o There were "left over" willow stakes that were planted in between the rocks placed at the toe of the fill and in between the triangular spaces.
- In addition to the willow stake planting, large rocks were randomly placed at the toe of the Steep Slope Area fill along the floodplain area.

## 3.11.2.7 Ford Road Repairs

Precision Paving Inc., subcontracted by Haynes, performed the Ford Road repairs for seven areas on November 20, 2012. The repair areas were previously identified by the Brown and Caldwell CQA monitor, Haynes, and the City of Elyria Assistant City Engineer. The following work was performed by Precision Paving Inc.:

- · The identified pavement areas were milled down to the road subbase.
- Liquid tack material was sprayed on the subbase.
- 4-inches of ODOT 301 asphalt base and 3-inches of ODOT 448 asphalt surface were placed and rolled.
- Sealant was applied around the edges of the repairs.

## 3.11.2.8 Fence and Gates Installation

Inline Fence Inc., subcontracted by Haynes, installed the fence sections and gates at the North and South Access Roads on January 7, 2013 and January 15, 2013. The following work was performed by Inline Fence Inc.:

- Work performed on January 7, 2013:
  - o Holes were augured for the fence and gate posts.
  - Fence and gate posts were set, plumbed with a level, and the annular space of auger hole as filled with concrete. The concrete was allowed to harden before the fence sections and gates were installed.
- Work performed on January 15, 2013:
  - The fence sections were assembled and attached to the fence posts.
  - The double-swing gates were attached to the gate posts.
  - o The Brown and Caldwell CQA monitor bought combination locks and locked each gate.

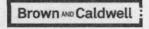
## 3.11.3 CQA Monitoring

Brown and Caldwell's CQA monitor(s) and Geologist visually observed the Site Restoration and Closure activities for workmanship and continuity. The Site Restoration and Closure activities were documented in written format using field books and forms with photographs used to provide visual documentation. Daily Field Logs providing a summary of the Site Restoration and Closure activities are provided in Appendix A with the construction photographs and descriptive photograph log provided in Appendix B. The following items were observed and documented by the Brown and Caldwell's CQA monitor during performance of the Site Restoration and Closure activities.

## 3.11.3.1 Groundwater Monitoring Well Installation/Development

The Brown and Caldwell Geologist observed and documented the following for the well installations:

- The ATV drill rig set up on the correct location for each new well.
- Prepared a field log for each boring based on the soil cuttings and split-spoon samples.
- · Proper borehole depth.



- Performed PID monitoring of the soil cuttings and split-spoon samples.
- Proper well construction.
- Proper placement of the soil cuttings and decontamination water discharge.
- Proper field survey for location and control.

The Brown and Caldwell Geologist observed and documented the following for the well development:

#### TTL

- Use of proper well development techniques.
- · Measurement of field parameters.
- Proper discharge of the well development water.

## Brown and Caldwell

- Measured and recorded water levels.
- · Use of proper well development techniques.
- Measured and recorded field parameters; temperature, pH, conductivity, and turbidity.
- Filled out the Well Development Water form for each well.
- · Proper discharge of the well development water.

#### 3.11.3.2 TRM Installation

- Proper TRM anchor trench construction.
- Proper TRM placement, overlap, and anchoring.
- Proper staples/anchor pins spacing and installation.
- Proper TRM infill with the FGM/seed/fertilizer/water slurry.

#### 3.11.3.3 Upper Surface Area Vegetation

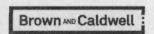
- The final surface of the topsoil and the adjacent disturbed areas were ready for vegetation.
- Collected seed tags and fertilizer information to confirm type and quantity of materials used.
   Example seed tag and fertilizer information is provided in Appendix L.
- The proper quantities of seed and fertilizer were loaded with water into the hydroseeder.
- The seed/fertilizer/water slurry was sprayed evenly across the areas to be vegetated.

### 3.11.3.4 Steep Slope Area Vegetation

- The final surface of the topsoil, "cleated" by the dozer tracks, and the adjacent disturbed areas were ready for vegetation.
- Collected seed tags and fertilizer information to confirm type and quantity of materials used. Example seed tag and fertilizer information is provided in Appendix L.
- The proper quantities of FGM, seed, and fertilizer were loaded with water into the hydroseeder.
- The FGM/seed/fertilizer/water slurry was sprayed evenly across the areas to be vegetated.
- Proper alignment, end overlap, and staking of the straw wattle.

## 3.11.3.5 Demobilization

- Observed and documented the electric service disconnection and onsite power pole removal.
- Observed Haynes and Haynes' subcontractors' equipment, facilities, and ancillary items removal from the Site.



Documented the final site walkthrough performed on October 23, 2012 by the Brown and Caldwell CQA monitor and Haynes to check the integrity of the silt fence and straw bales along the Black River floodplain and the overall cleanliness of the Site. No issues were identified during the walkthrough and the Phase II Remedial Action work was shutdown.

#### 3.11.3.6 Willow Stake Planting

- Confirmed the type, number, and condition of willow stakes ordered.
- Documented and photographed the willow stake planting in a 5-foot triangular spacing creating three rows within the designated horizontal floodplain area.
- Documented and photographed the random placement of large rocks at the toe of the Steep Slope Area fill within the designated horizontal floodplain area.

## 3.11.3.7 Ford Road Repairs

Written and photographic documentation for the following Ford Road repairs:

- The identified pavement areas were milled down to the road subbase.
- Liquid tack material was sprayed on the subbase.
- 4-inches of ODOT 301 asphalt base and 3-inches of ODOT 448 asphalt surface were placed and rolled.
- Sealant was applied around the edges of the repairs.

### 3.11.3.8 Fence and Gates Installation

Written and photographic documentation for the fence and gates installation:

- Work performed on January 7, 2013:
  - Location and auguring of the fence and gate post holes.
    - A representative of the City of Elyria Engineering Department was at the Site to verify the setback distance of the fence and gate post holes; the locations were verified.
  - Confirmed the fence and gate posts were set, plumbed, and the annular space of auger holes were filled with concrete.
- Work performed on January 15, 2013:
  - Confirmed the concrete had hardened and the fence and gate posts were upright and plumb.
  - Observed the fence section assembly and attachment to the fence posts.
  - Observed the double-swing gates assembly and attachment to the gate posts.
  - o Placement of the combination locks on each gate

# Section 4

# **Final Site Inspection**

As required by Section XIV - Certification of Completion, Paragraph 53a – Completion of the Remedial Action of the Ford Road Landfill CD, the Final Site Inspection (Inspection) was scheduled for December 4, 2012. The Inspection was attended by representatives of the following entities:

City of Elyria Metro Parks Service
Ford Road Settling Parties Haynes Construction
U.S. EPA Brown and Caldwell
Ohio EPA Chronicle-Telegram

Demaree Collier of the U.S. EPA conducted the Inspection which included the following activities:

- Presentation of an overview/summary of the Site and the Phase I and Phase II Remedial Action implementation;
- A question/answer period;
- A Site walkthrough; and,
- Development of the "Punch List" items required to be completed by Haynes.

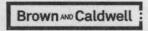
The Inspection summary is provided in Appendix A.

Due to scheduling conflicts, William T. Frederick of the ACOE was unable to attend the Inspection. Mr. Frederick, Joe Montello of the Settling Parties, and Rick Isaac of Brown and Caldwell met at the Site on November 30, 2012 to perform a Pre-Final Inspection. This Pre-Final Inspection allowed Mr. Frederick an opportunity to view the Site and ask questions for his Pre-Final Inspection presented to Demaree Collier of the U.S. EPA.

## 4.1 Erosion Issues

Following completion of the Phase II Remedial Action fieldwork activities on October 26, 2013, the Site was subjected to weather conditions i.e. heavy rainfall in the order of plus seven inches and high winds related to Hurricane Sandy between October 27, 2012 and October 31, 2012. The heavy rainfall caused erosion issues, which were observed and documented during the Inspection. Addressing the erosion issues was included in the Punch List developed for the Site during the Inspection.

Haynes addressed several erosion issues related to a major gully centrally-located in the Steep Slope Area Soil Buttress north of the Sedimentation Basin, gullies associated with the Downchute Channel, and repair of a gully across the upper portion of the South Access Road before the Inspection date. Based on the continuing rainfall experienced at the Site, the U.S. EPA, USACOE, and Ohio EPA agreed that some of the Punch List Items could be performed in the spring of 2013 when Site and weather conditions would be more favorable. This decision will minimize or eliminate further damage to the Site potentially caused by Haynes mobilizing equipment and performing the erosion repairs due to Site conditions.



# 4.2 Preliminary Close-Out Report

The Preliminary Close-Out Report (PCOR) was prepared by Demaree Collier of the U.S. EPA and submitted to Patrick S. Steerman of Steerman Environmental on February 8, 2013. The PCOR documents the completion of construction activities for the Phase I and Phase II Remedial Action implementation (construction) and signifies that the construction was performed consistent with the Record of decision (ROD), the Scope of Work in the CD, and the approved RDWPs and specifications. No significant deviations from the approved design plans occurred during the construction and the main components of the the selected remedy have been completed.

The PCOR addresses the Punch List items identified during the Inspection and states the Punch List items need to be addressed.

# Section 5

# Operation and Maintenance Plan Implementation

Implementation of the approved Operation and Maintenance (0&M) Plan will be performed by Metro Parks in accordance with a participation agreement between the Ford Road Landfill PRP Group and the Metro Parks. The Metro Parks will be responsible for performing the Site inspections and maintenance of the Remedial Action as required by the approved 0&M Plan. Site inspections forms, provided in the approved 0&M Plan and maintenance records will be required to be filled out and kept on file for review. Issues such as differential settlement, stressed vegetation, blockage of surface drainage features, etc. will be repaired and maintained by the Metro Parks when identified during the Site inspections.

The groundwater monitoring required by the O&M Plan will be performed by the Ford Road Landfill PRP Group.

# 5.1 Interim Operations and Maintenance Activities

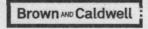
Interim 0&M activities implemented during the winter 2011/2012 shutdown period included the following:

- Periodic observations of the Site were made by the Metro Parks.
- Brown and Caldwell CQA monitor(s) periodically inspected the Site.

Based on the results of the inspections, the following activities were performed:

- The plastic covering the soil stockpile areas at the Upper Surface Area Soil Placement Area were pulled back in place and anchored with sand bags on January 18, 2012 and April 13, 2012.
- The rip-stop poly tarp material panels covering the soil material placed against the slopes of the landfill at the Lower Soil Placement Areas were pulled back in place and anchored with landscape staples and sand bags on February 9, 2012 and April 12, 2013.
- Silt fence repairs were performed on February 9, 2012 and silt material was removed from around straw bales.

Copies of the Inspection Reports are included in Appendix N.



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No Appendicies Induded